CIO

HE MAGAZINE FOR INFORMATION EXECUTIVES

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COVER STORY

A Difficult Course

Can Wireless Technology Provide A Strategic Hole In One?

ALSO INSIDE

IS In Japan

Wilson Sporting Goods Co.'s
Dave Jensen (left) and Joe Manning

AN INTERNATIONAL DATA GROUP PUBLICATION

Putting Technology

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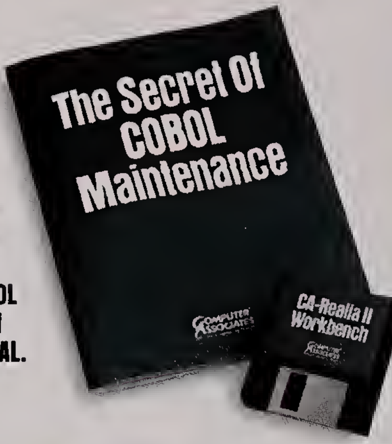

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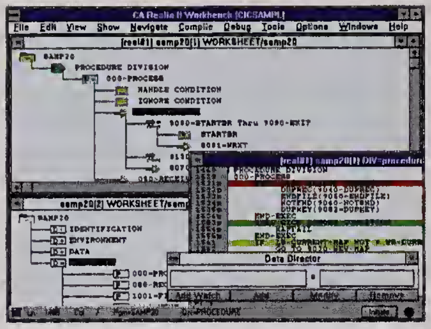

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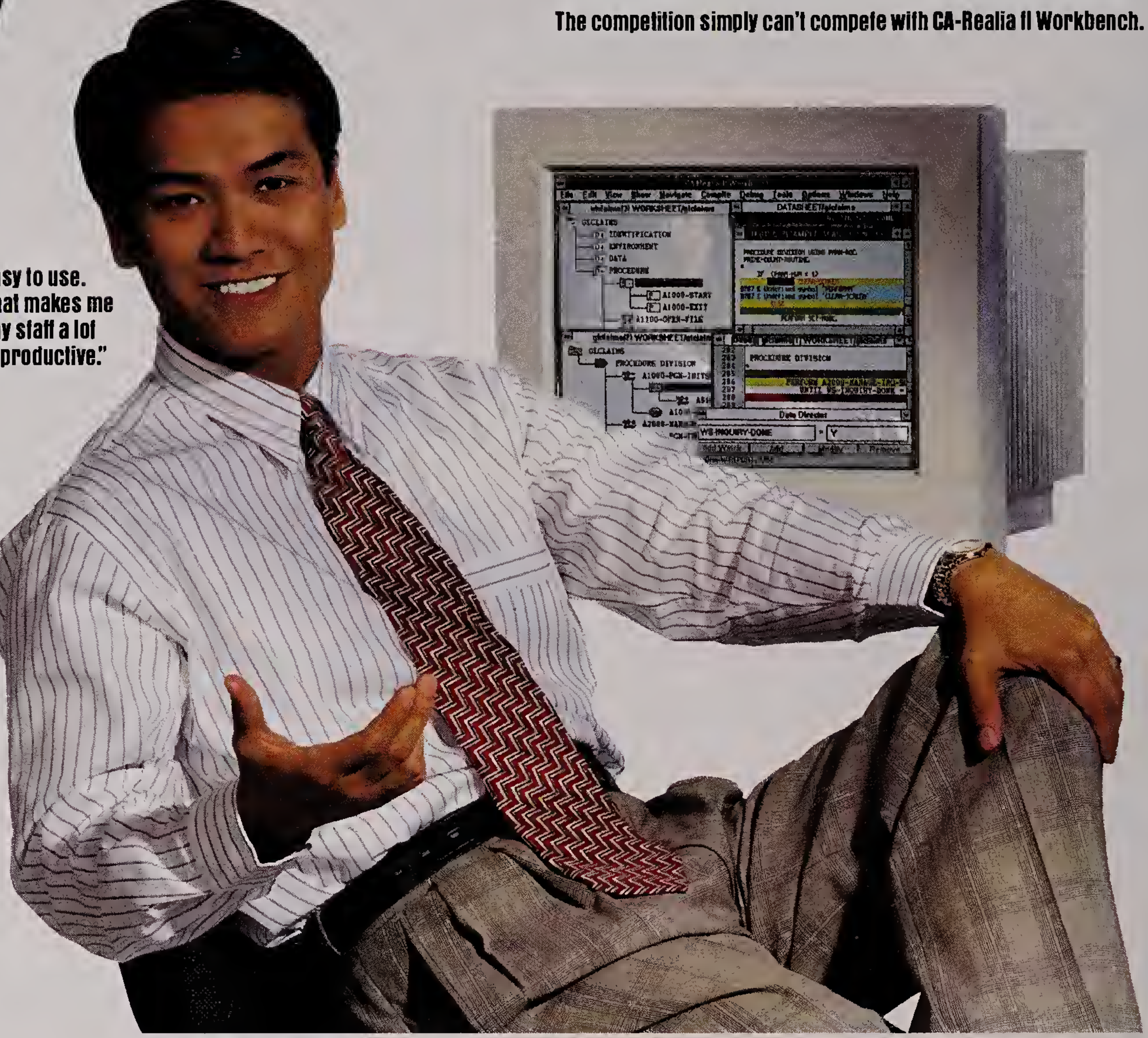

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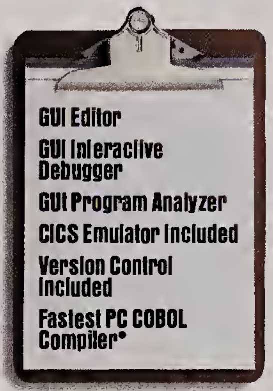

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CIO

VOLUME 8, NUMBER 1

COVER STORY

WIRELESS COMMUNICATIONS 37

Getting Unwired

Though wireless technology is still used primarily for voice communications, some companies are using it for strategic business applications. Their consensus: The implementation pain is real, but it can be worth it. *By Carol Hildebrand*

Look Ma, no wires **37**
Cover photo by Marc Berlow

FEATURES

Where are they now? **26**

STRATEGIC SYSTEMS REVISITED 26

Twice-Told Tales

CIO has examined many companies embarking on extensive IS reorganizations or strategic-system implementations. But real life doesn't end at the bottom of a page, and long after those stories ran, their subjects have soldiered on with varying degrees of success. Here, we offer a progress report on three of those companies, to see how their plans have panned out over time. *By Megan Santosus*

I.T. IN JAPAN 46

The Eastern Front

Now that the worst recession in Japan's postwar history has forced companies to rethink their approach to IT, they are closely studying U.S. practices, hoping to emulate successful strategies while avoiding the pitfalls. *By Kathryn Graven*

A yen for IT **46**

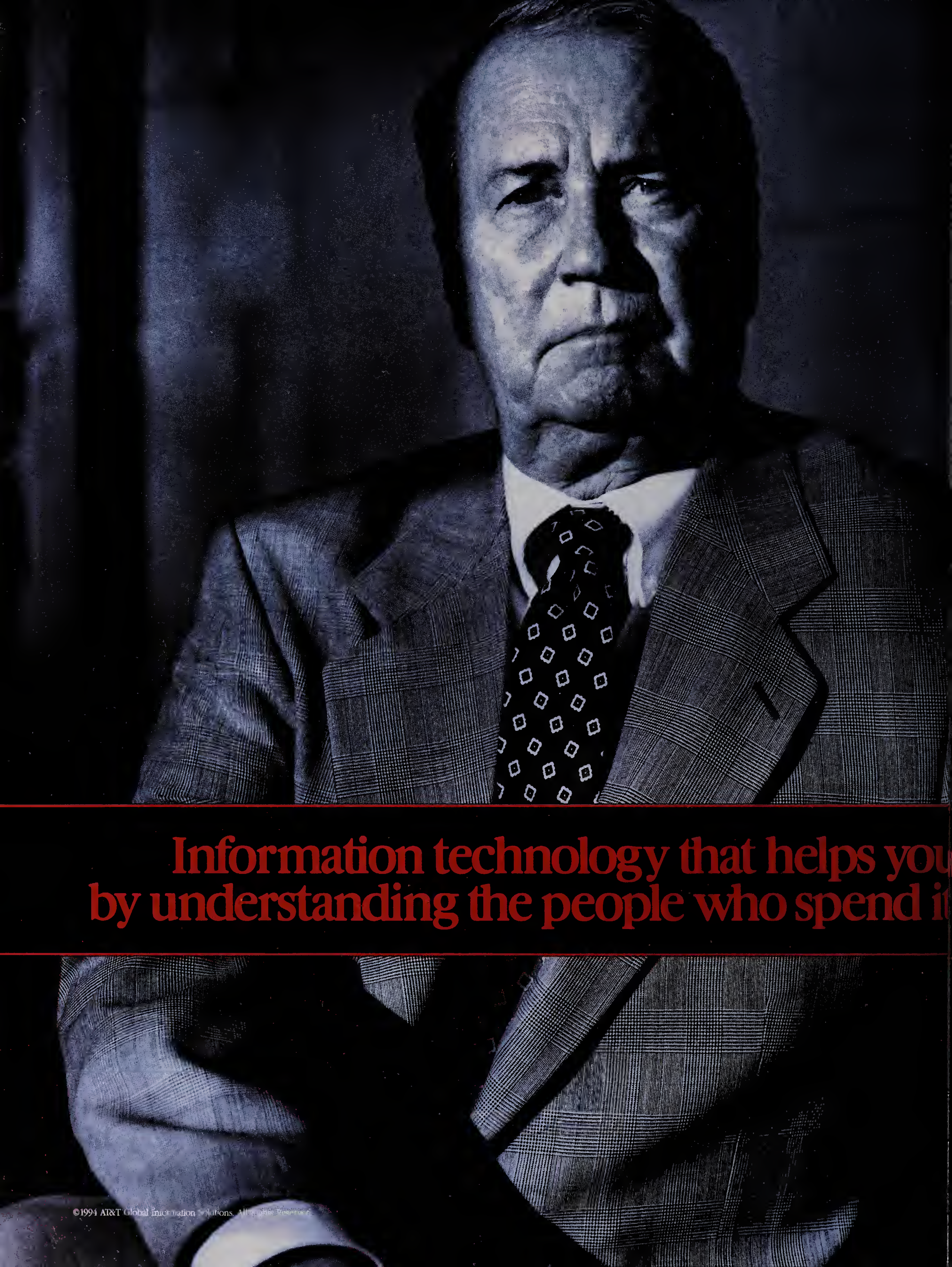
The Info Economist
54

INTERVIEW: GEORGE GILDER 54

The Gildered Age

Political theorist and technology visionary George Gilder holds forth on the prospect of burgeoning bandwidth, the curse of meddling governments, and the care and feeding of an information economy.
By Lew McCreary and Thomas Kiely

MORE ▶▶▶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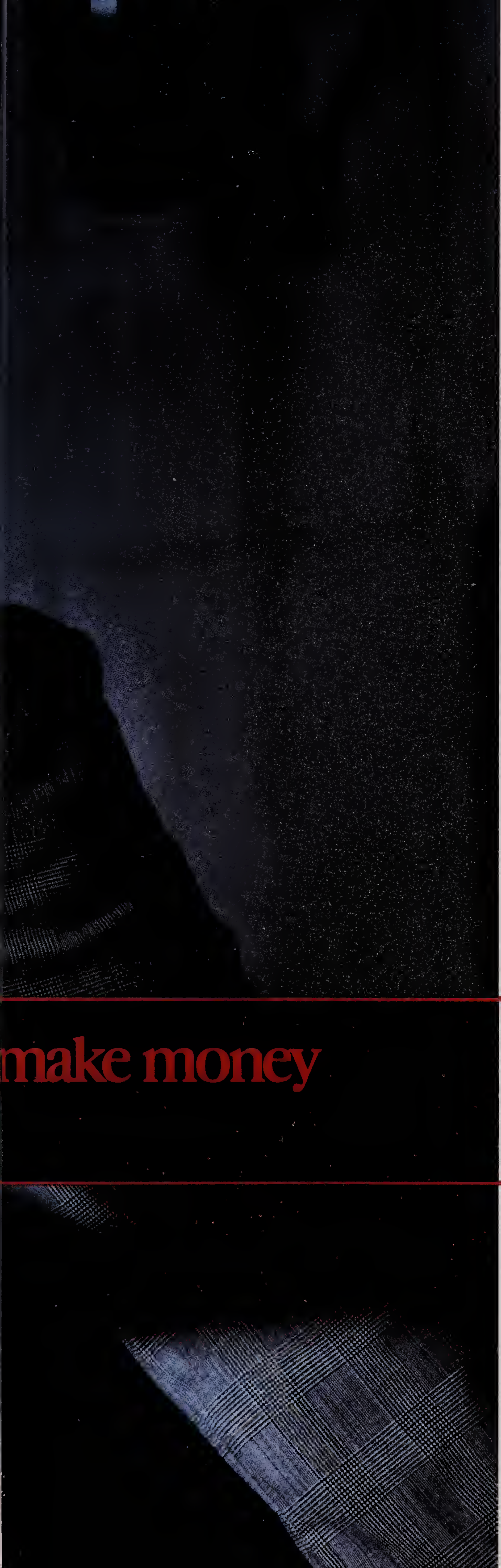

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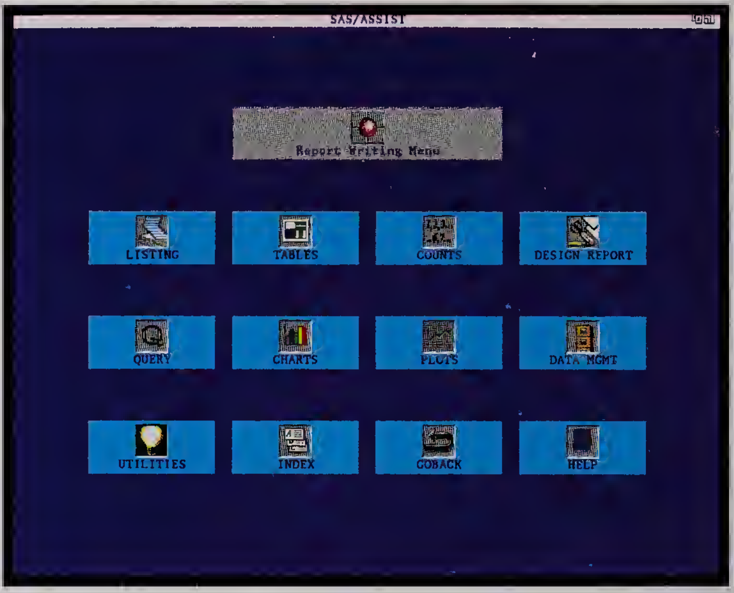
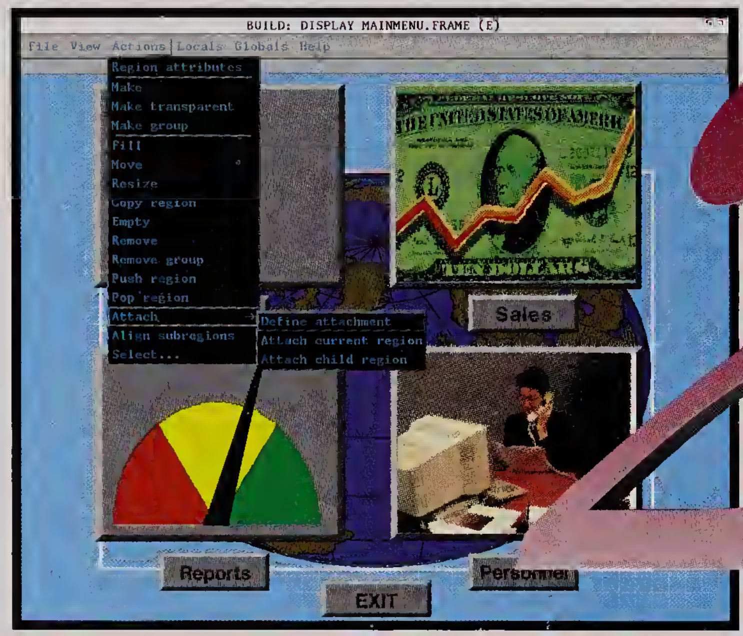


Empower Your Applications Developers



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FEATURES (CONT.)

I.S./BUSINESS PARTNERS 62

Dynamic Duos

CIO/CEO partnerships prove that two heads are often better than one. SIM's eighth annual Partners in Leadership Awards recognize senior business and IS executive collaborations that have yielded exceptional results. *By P.W. Rollins*

Partners in change **62**

Awaiting ATM **70**

COLUMNS

ELECTRONIC COMMUNICATIONS 22

INSIGHTS: PEOPLE FIRST

Electronic communications can play a significant role in business partnerships, but first the fundamental human relationships must be in place. *By Rosabeth Moss Kanter and Pamela A. Yatsko*

ATM UPDATE 70

STATE OF THE ART: A SWITCH IN TIME

On the surface, ATM sounds like a big-bandwidth panacea, moving massive amounts of video, voice and data across our enterprises and into our homes. But while the technology is poised to take off, high costs, inadequate standards and lack of a track record are keeping it momentarily tethered. *By John Edwards*

INTERACTIVE SOFTWARE 80

WORKING SMART: NEW VALUE SYSTEMS

Nordstrom Valves set out to find a better way to market its products. Along the way, it also gained a tool that lets customers do their own configuration. *By Megan Santosus*

Sea signals **14**

DEPARTMENTS

Editor's Letter 8

Publisher's Letter 12

Trendlines 14

- **Calendar of events**
- **Auto-dealer network**
- **Dissidents online**
- **Keeping watch**
- **Corporate procurement**
- **Underwater communication**
- **Multimedia for pharmacists**
- **Airport ease**

FYI 76

Index 78

LETTER FROM THE EDITOR

George Gilder, cyberspace guru, answers some intriguing questions about information management in this issue of *CIO*. Among his many cogent comments is the notion that networks really *are* dumb. What counts are the people who manage transitions and maintain connections—the CIOs.

Gilder, interviewed early last summer by *CIO* Executive Editor Lew McCreary and former Senior Editor Thomas Kiely, painted a far-ranging landscape of the information age. (Please see "The Gildered Age" on Page 54.) CIOs who look to our magazine for new ideas will find more than an ample amount of grist for an extremely active mill.

Consider this. The industrial era made the hierarchical organizational structure necessary; narrow-band information links also required this structure. Today, organizations are in the business of organizing information to feed the information economy, and all structures are in the process of changing.

Gilder sees the CIO as an entrepreneur who can make sense of an emerging web of networks that will open up highways for goods and services. Navigating, maintaining and filling the bandwidth will be the lifeblood of the future economy, he says. He considers government regulation of industrial policy to be at odds with the entrepreneurial process. "The government is always the dog's best friend," he says.

Many of Gilder's views are far-out and just a little scary, but information executives are accustomed to constantly managing change and often find themselves in uncharted waters.

This issue chronicles a variety of experiences in these roiling waters. We revisit some of the strategic systems implemented by forward-thinking CIOs who found themselves operating in strange corporate territories. In "Twice-Told Tales," beginning on Page 26, Senior Writer Megan Santosus follows up with these executives from Amoco Corp., General Public Utilities Corp. and Janus Capital. The CIOs do not regret the directions they took with their strategic systems, yet their 20/20 hindsight is instructive.

And what about information executives considering the implementation of the much-heralded wireless technology? Senior Writer Carol Hildebrand finds there are many missing links in adapting wireless technology for strategic business applications. CIOs at companies that seek the wireless way confide that the technology is not quite ready for prime time, making widespread implementation difficult. (Please see "Getting Unwired" on Page 37.)

CIOs are being called to link the many parts of their enterprises. It's a daunting task and one that often requires exploring new ground. At *CIO*, we have a continuing dialogue with you, our readers, to help you prepare for the challenge.

Marcia Blumenthal

CIO

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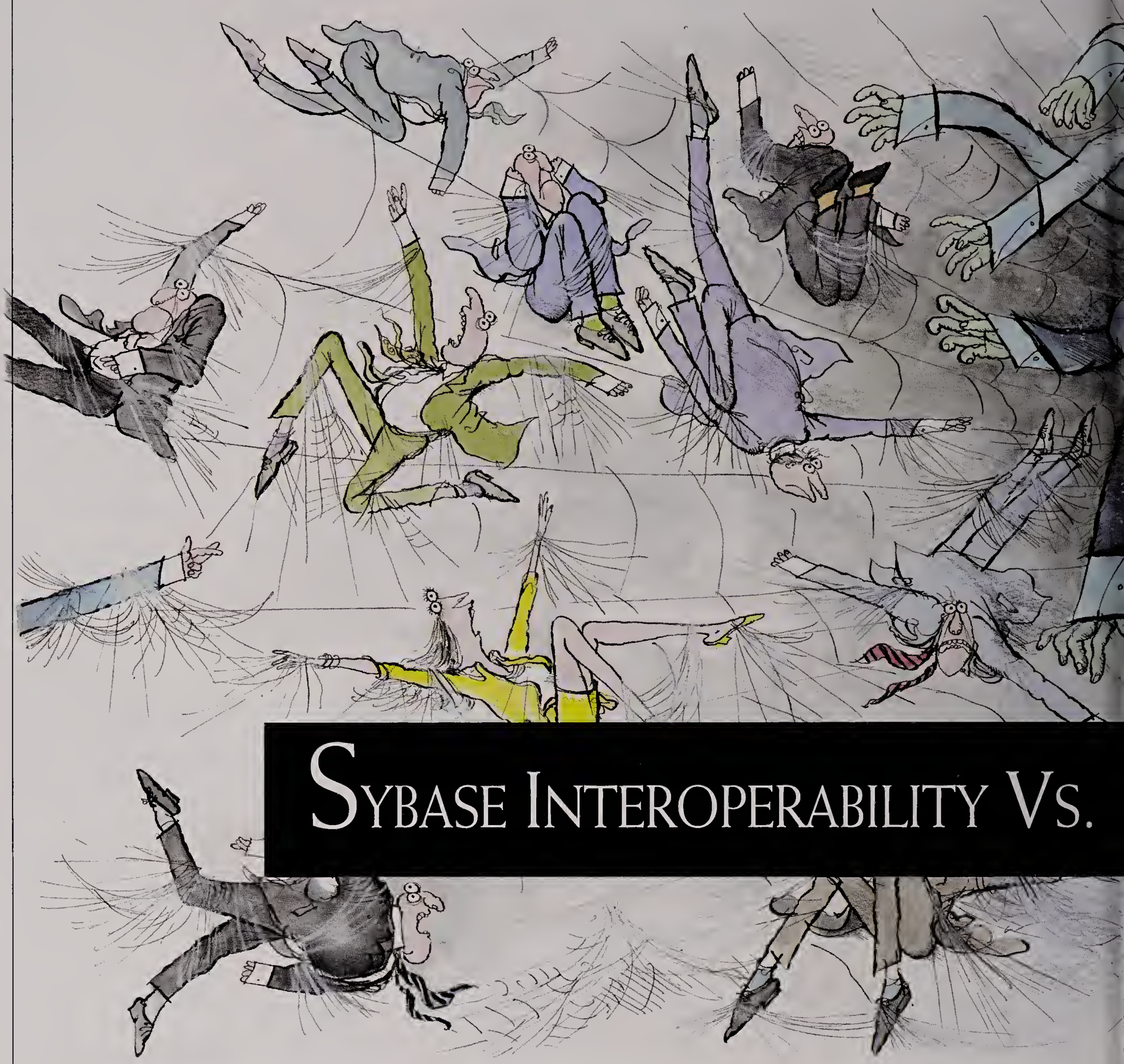

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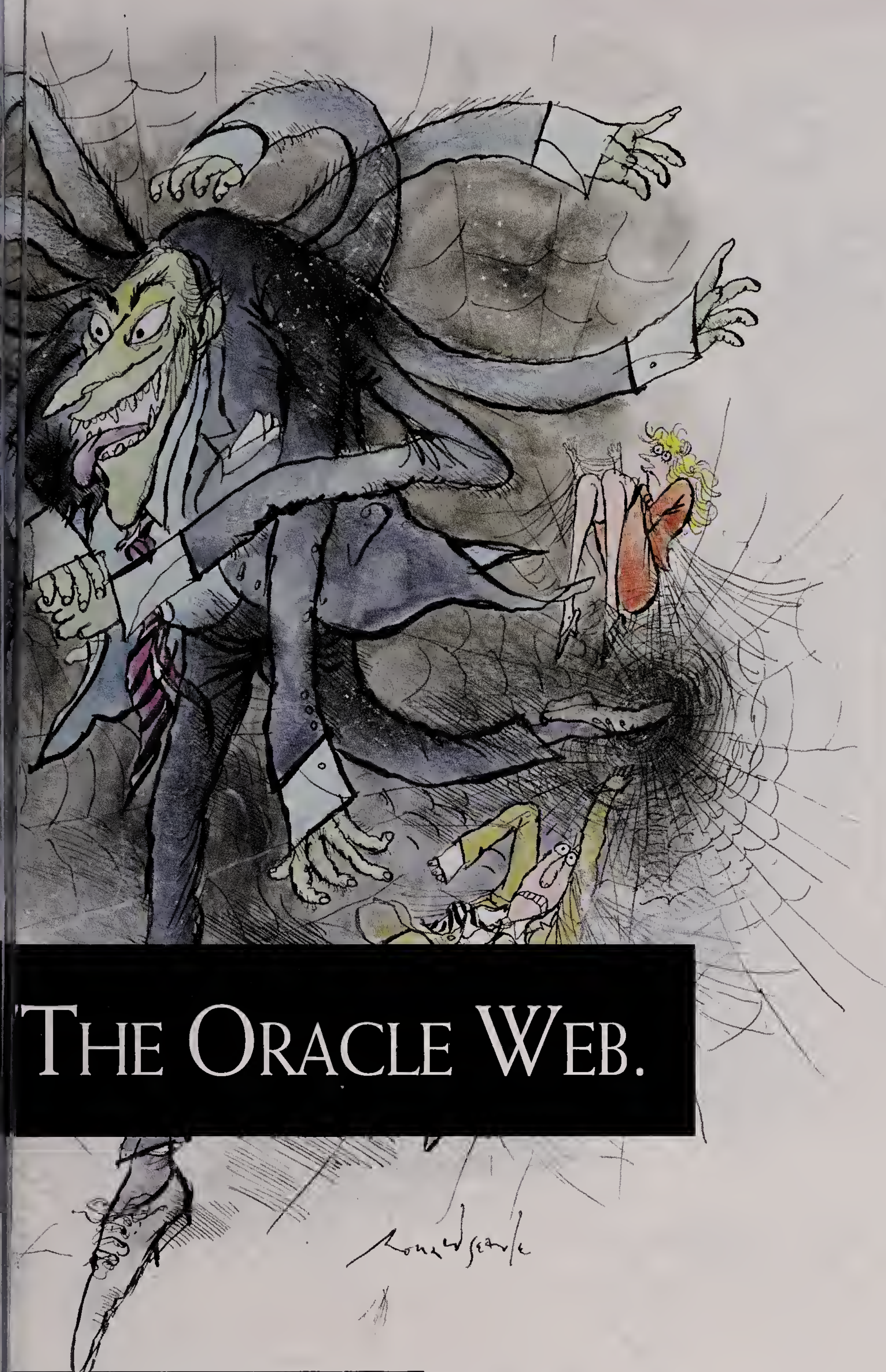

THE ORACLE WEB.

Four Key Differences	Sybase	Oracle
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— Ron Krikorian,
Air Products and Chemicals

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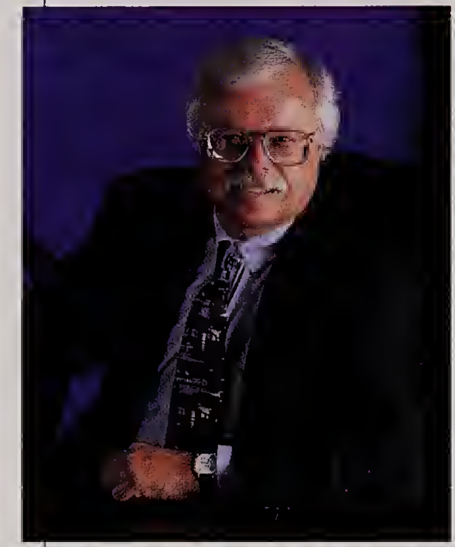

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> *"My impression is that the Japanese don't move forward with something until they really understand it. They are deliberate and careful in choosing technology. But once they make their decision, they move aggressively."*
>
> *—Allen Miner*
> *Director of Technology*
> *Oracle Japan Ltd.*

The worst recession in Japan's postwar history is forcing companies in that country to rethink their approach to IT (please see "The Eastern Front," beginning on Page 46). Although Japan has won worldwide recognition for its advanced production methods and technology-driven factories that churn out high-quality products, it has been slow to embrace IT as a means to shore up white-collar productivity and effectiveness.

Technologies that U.S. companies often take for granted are yet to be universally adopted as part of the Japanese business infrastructure. For example, desktop computers are the exception rather than the norm, and single word processors are often shared by many employees. Electronic mail is a rarity.

In those companies moving to embrace technology, the IT-management function is typically shared among several top managers or outsourced. And although the CIO role has not yet emerged in this consensus-driven society, many forward-thinking Japanese business executives are scrutinizing U.S. IT-management practices in an attempt to adopt what works and learn from our mistakes.

Japan is poised to take advantage of new technologies to manage change and maintain worldwide competitiveness. *CIO* will be watching emerging issues and trends in this market in the future.

P.S. We look forward to seeing you at the upcoming CIO Perspectives conference, "IT Economics: Business Value & Profit Maximization," to be held Oct. 23-26 at the Westin La Paloma in Tucson, Ariz. If you haven't yet registered, please call us at 800 366-0246.

Coming In CIO

S.O.S.

Although Dan Cheever didn't know much about information systems, he knew that inadequate IS support was hurting his organization, American Student Assistance. After experiencing the most disastrous processing season in its 35-year history, the student-loan guarantor needed some straight answers about what was wrong with its systems and how to fix them. The company brought in a consultant, who showed management that it was in fact in a death spiral and that the only way out was through radical reengineering.

End of an Era

The days of relying solely on outmoded, traditional financial measures to assess the returns on IT investment are waning. Although the danger of overinvesting or investing unwisely in IT still concerns business executives, the productivity paradox is officially dead. Those dismal scientists, the economists, have been the unexpected harbingers of this good news.

Help Wanted: Programmers

The mass exodus to client/server computing has led to skill-set shortages within many IS departments—not an especially new problem. What makes the current situation different is the shortage of system architects who understand mainframes, Unix computers, image servers and PCs, and have the know-how to network all that hardware together. *CIO* reports on organizations' solutions to this problem.

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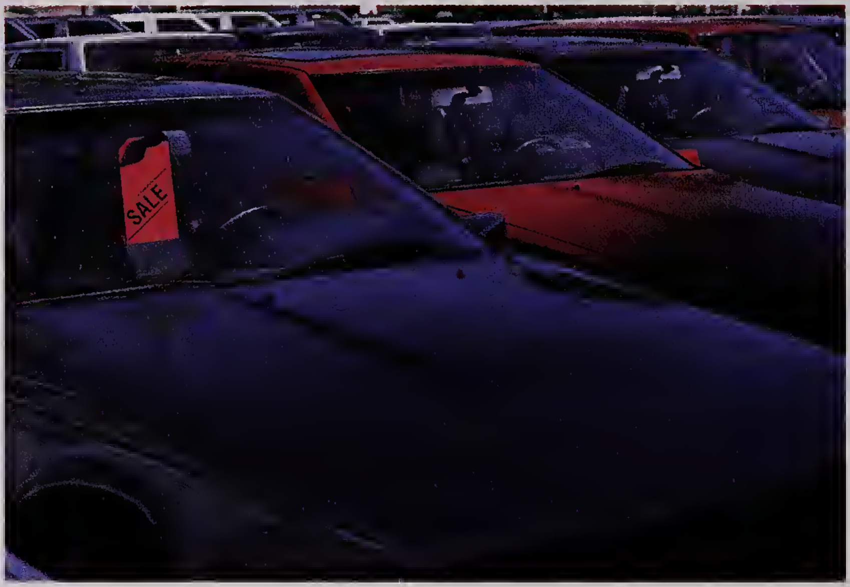
AUTO SALES

DIVING INTO THE CAR-POOL



Car salesmen: In the ranks of public trust, they score just below tabloid journalists and just above incumbent politicians. But a bad rep isn't all that's making their lives difficult. Consumer loyalty to brand names is disappearing, reported payoffs to manufacturers have attracted some negative press, and old hands find themselves competing against young Saturn dealerships that stage love-ins with every purchase.

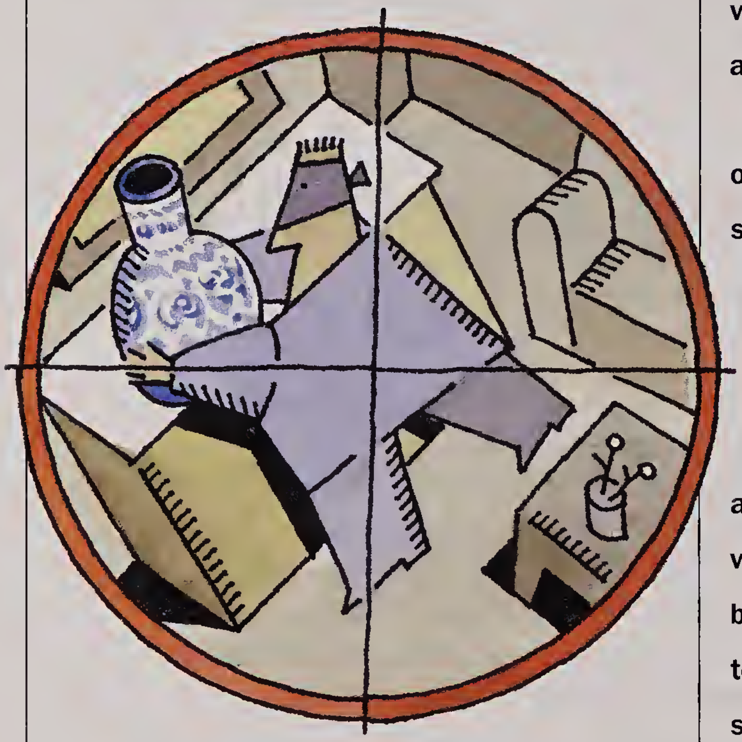
Enter the auto dealer's longtime best friend: J.D. Power & Associates of Agoura Hills, Calif. Power, the man who brought quality surveys to the auto industry, is introducing the Power Information Network, a tool for tracking who's selling what, where, for how much and with what options. The idea is to let dealers monitor consumer preferences and manage their stock the way Wal-Mart and other retailers do. Power predicts that dealers using the network could see their normal 60- to 65-day inventory cut in half, for an industrywide savings of $3.5 billion a year.

Participating dealers upload their sales and other data overnight in batch files: Power & Associates then adds up the numbers and reports back to the dealers, which can gauge how they stack up against their peers. The technical details of the project are daunting, admits Michael Murray, Power's director of dealer sales and marketing. For one thing, there's little standardization among auto dealerships. "Everyone reports gross profit differently," says Murray. One dealer may not pay out a commission unless the sale makes a $200 profit, whereas others pay out regardless—all of which must be taken into account by the programmers.

Vendors working on the Power Information Network so far include Reynolds & Reynolds, Data Consultants and ADP. J.D. Power is using

IN SIGHT, OUT OF MIND

Absence makes the heart grow fonder and the mind grow anxious—especially if what you're absent from is something in which you have a considerable financial investment.



There's nothing like fleeting thoughts of burglars absconding with that priceless Ming vase to ruin your vacation on the Riviera.

Iterated Systems Inc. of Norcross, Ga., has taken its clients' peace of mind to heart, with a system that enables users to keep watch remotely over their cherished businesses and domains. The Video Teleport system connects closed-circuit-television cameras to a telephone line; scenes can be recorded, then viewed on PCs equipped with modems and Iterated's software.

"Previous attempts to deliver this capability on regular telephone lines have resulted in a succession of still frames instead of realistic motion," says Alan Sloan, president and co-founder of Iterated Systems. In this system, "the action is much closer to television."

Iterated suggests applications as mundane as checking up on the old homestead while on vacation and as dramatic as monitoring a robbery or hostage situation in progress. The system was originally tested by the Army Research Laboratories, which used it to allow soldiers in the field to transmit surveillance video over walkie-talkie links.

The package includes a transmitter, priced at $2,995, and receiver software, at $495. For information, call 404 840-0728.

PHOTO BY TONY STONE IMAGES/BARBARA FILET; ILLUSTRATION BY ROBIN JAREAUX

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OPE STATE_CHANGE Mar 25 11:12 rainbow rainbow State Change:ALARM OK       Current st
OPE STATE_CHANGE Mar 25 11:12 rainbow rainbow State Change:OK       ALARM Current st
OPE STATE_CHANGE Mar 25 11:17 rainbow rainbow State Change:OK       ALARM Current st
OPE STATE_CHANGE Mar 25 11:18 rainbow rainbow State Change:ALARM OK       Current st
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a 2.2GB Pentium-based PC to process the data in a statistical package from SAS Institute Inc. "But SAS looks at every single record every single time, and with 80,000 records so far, it's starting to get kind of slow," says Murray.

Dealers already receiving the detailed competitive reports aren't complaining. "The information allows us to keep our finger on the pulse of the competition," says Ed Kawulak, general manager of Lancaster Jeep-Eagle-Mazda-Mitsubishi in Lancaster, Calif. For example, J.D. Power sent Kawulak a report analyzing bank financing for used cars. "This tells us who has the best rates and who is most hungry for the business," says Kawulak. "I saw that Chrysler Credit was getting only 1 percent of all the loans, and I was able to call and tell them that they're not buying enough used cars."

Whether the service helps the industry reduce inventories and save money remains to be seen, however. Kawulak says the new information has yet to affect his stocking behavior.

The Power Information Network is currently being piloted in California, with 58 franchise points receiving full service (a dealer that sells both Hondas and Toyotas counts as two franchise points). Power says there are another 750 dealers in the wings that don't yet have the ability to receive data electronically. The company plans to take the service national next year.

DAS BOOT UP

Underwater doesn't have to mean out of touch. And while most CEOs have more on their minds than how to communicate with their fellow executives from somewhere below sea level, it's a challenge that the U.S. Navy has been facing for some time.

That's why the Navy is pleased that a new communications system for submarines seems to hold water. The system, from GTE Government Systems Corp. in Chantilly, Va., uses a commercial satellite transponder and specially configured off-the-shelf equipment to give submarines at periscope depth the capability to exchange data at enhanced transmission speeds.

In a recent test, the Navy linked the attack submarine USS Albany to the Atlantic Submarine Command headquarters in Norfolk, Va. The submarine was able to exchange information at a rate 20 times faster than current satellite data systems allow. The technology will enable sub commanders to exchange images, provide live video and participate in videoconferences with shore-based commanders. Periscope video and images can be transmitted ashore for analysis, and the submarine can pull images from shore-based files while exposing nothing more than a single mast for a very short time.

The new system should "make submarines more-visible participants in littoral and amphibious warfare operations," says John Messier, vice president of GTE Federal Systems Division.

IT'S THE LITTLE THINGS

CFOs may gripe about the multimillion-dollar price

tag on that new computer system, but it's the straws that are breaking the backs of corporate camels. According to MasterCard International Inc., of the nearly $400 billion spent annually on business procurement in the United States, $331 billion goes for small purchases (the definition of "small" varies by company; for what it's worth, the U.S. government draws the line at $25,000). But because the internal cost of processing is the same for purchases great and small, it can end up virtually doubling the cost of a small transaction.

MasterCard's solution: a corporate procurement card designed to help companies maintain control of small-purchase activity while reducing the associated administrative costs. The card captures incremental data at the point of sale, including sales tax, accounting and purchase-order codes, and merchant type.

Information is stored in the company's database, which can transmit files or reports customized to corporate specifications. That cuts down on administrative paperwork and frees financial executives and purchasing managers to focus on more-strategic matters.

ILLUSTRATION (LEFT) BY FRAN O'NEILL; ILLUSTRATION (RIGHT) COURTESY OF BESSEN TELLY & LEE

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TRENDLINES

TWO TERMINAL CASES

Forget the mess at Denver's new airport, where an automated baggage system made headlines earlier this year for flinging luggage around like the gorilla in the American Tourister commercials. In several other cities, technology is making life a little bit friendlier for passengers and airline employees alike.

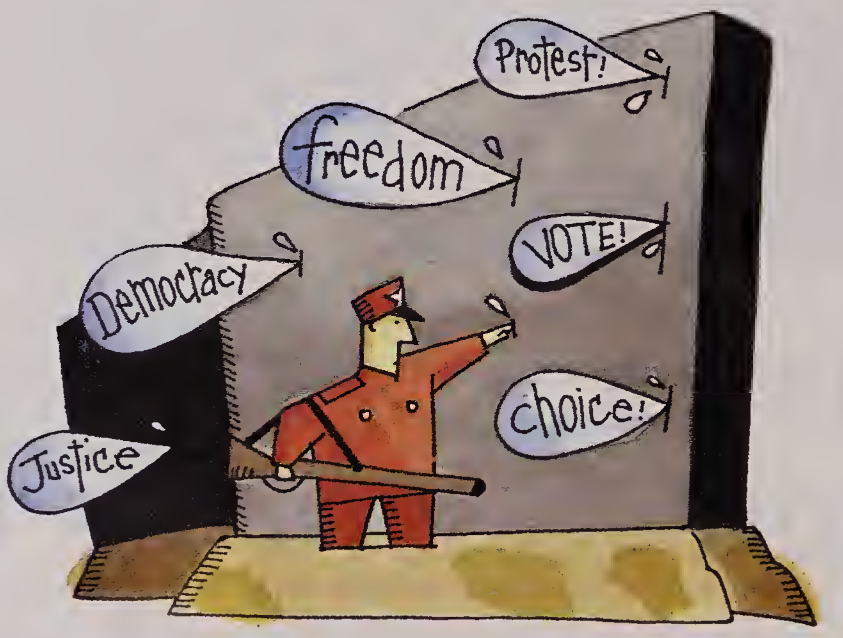
In Atlanta, for example, Southern Bell is preparing to wire Hartsfield International Airport with a new telephone system based on an Advanced Information Network (AIN). Since airlines have their own telecommunications systems with varying configurations and operational features, lengthy authorization codes are required when, say, United and USAir end up sharing a gate—and the same phones.

Hartsfield's new system, which should be operational in February, allows agents to accommodate changing gate assignments by simply pushing a few buttons on their phones. Agents log on using a phone number and password; that changes the system's configuration to conform to the specifications of the airline using the gate.

Computer maker Siemens Nixdorf Information Systems Inc., meanwhile, is helping Lufthansa customers in Germany keep track of their frequent-flier miles with self-service voucher printers located in airport lounges. The printers allow frequent fliers to obtain a statement of distances flown and credit received. Customers feed their personal cards into a self-service machine, which is linked to Lufthansa's central computer in Frankfurt. Seconds later, the machine prints their frequent-flier information on a voucher card. Since the system was rolled out in Frankfurt and Munich, customers have requested an average of 200 statements daily. ■

ELECTRONIC PUBLISHING

CENSORSHIP SPRINGS A LEAK


Protest!
freedom
VOTE!
Democracy
choice!
Justice

Last August, feminist writer Taslima Nasrin managed to escape from Bangladesh to Sweden after angry Muslim fundamentalists called for her death or imprisonment for criticizing the Koran. A week later, Nasrin's writings were loose as well—posted on the Digital Freedom Network, an online information service dedicated to circumventing political censorship.

The network is the brainchild of Howard Jonas, president of International Discount Telecommunications (IDT) in Hackensack, N.J., which claims to be the only company currently providing Internet access to every nation in the world. IDT is working with human-rights groups, including Index on Censorship, Human Rights Watch and The Committee to Protect Journalists, to digitally publish writings by political dissidents. The works then become accessible to anyone who can tap into the Internet—even in countries where the works are banned.

The first selections available on the Digital Freedom Network include the autobiographical *Searching for the Truth* by China's best-known dissident Wei Jingsheng, who is currently serving a prison sentence for his writing. Also online are *This Earth of Mankind* by Indonesian author Pramoedya Ananta Toer and works by authors banned in Egypt, Iran and Myamar (formerly Burma). (Salman Rushdie reportedly has declined to publish *Satanic Verses* electronically.)

"This is only the beginning," says Jonas, who has already earned a reputation—and the enmity of AT&T—by offering a service that lets callers from countries with high telecommunications costs save money by plugging into a U.S. dial tone. "We'll be getting banned material from all over the world to put on the Internet for people to read. This opens the doors to information for millions of people."

While no one denies that the Digital Freedom Network's goal is a noble one, the endeavor has attracted some criticism. The writers' group PEN, for example, points out that freely posting writers' works on the Internet could affect copyright protection and royalty payments. (PEN has itself spoken with a number of hu-

LOGO SUPPLIED BY BELLSOUTH TELECOMMUNICATIONS; ILLUSTRATION BY ROBIN JAREAUX

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man-rights groups about establishing some kind of human-rights communication system on the Internet.) And there remain questions about access in countries where computers that can tap into the Net are few and far between.

But Jonas has no reservations about the value of his endeavor.

"This is definitely the biggest boon for freedom of the press in my lifetime," he says. "In fact, it's probably the most exciting initiative since the Bill of Rights."

The Digital Freedom Network can be reached through the International Internet Association's gopher site at *gopher.iia.org* or via E-mail at *dfnidt@iia.org*.

A Pharmacist's Assist

Knowing which painkiller to sell just became less of a headache. A new system from Bergen Brunswig Corp. and Apple Computer Inc. promises to move pharmacists out of the microfiche era and into the age of multimedia.

AccuSource, which runs on an Apple Macintosh, uses color graphics, full-motion video and voice narration to give pharmacists detailed information on thousands of products and services, as well as prescription-substitute alternatives and Medicaid coverage. The system lists all the products stocked by health-care supplier Bergen Brunswig and their availability.

Pharmacists use various search criteria, including strength, price and manufacturer, to call up product data. They can then store that data in an order file and transmit the file to Bergen Brunswig for fulfillment. Updated information on products and promotions is sent to customers on CD-ROM; online information includes articles and industry news.

AccuSource is being marketed as a boon to manufacturers as well as sellers: Pharmaceutical makers can place spot advertising on the system to pitch their wares directly to the retail community. They can then track how many people see their message and what those customers actually buy. It's also an administrative tool, helping pharmacists manage their business information. For information, call 714 385-4000.

EVENTS

Re-Energizing the Enterprise 1994

The Westin Hotel, Boston
Oct. 19 & 20
Advanced Manufacturing Research Inc.
617 542-6600

This year's theme is "Winning Strategies for Manufacturers." The conference will bring IS executives from global manufacturing companies together with consultants and vendors for two days of discussion about the future of manufacturing information systems. Registration: $1,105

Workflow: Joining the Islands of Automation

ANA Hotel, San Francisco
Oct. 25 & 26
Delphi Consulting Group
617 247-1025

This year's industry seminar focuses on workflow and business-process redesign. The two-day conference is designed to help participants acquire information that will save them months of research, technology analysis and product evaluations. Registration: $1,200

Electronic Document Systems Conference & Exhibit

Phoenix Civic Plaza, Phoenix
Nov. 6-11
Xplor International
310 373-3633

"Share the Vision, Lead the Way" is the theme of this year's conference. It will offer close to 300 technical and application sessions, industry reports, workshops, roundtables and a three-day exhibit featuring the latest advancements in IT. Registration: $895-$995

James Martin World Seminar

Sheraton Crystal City, Washington
Oct. 31-Nov. 4
Extended Intelligence Inc.
312 346-7090

This five-day seminar addresses the role of the IS organization in business reengineering and the tools that must be used to accomplish it. Two one-day seminars focus on software reuse, engineering and comparison and evaluation of client/server tools. Registration: $1,995

CAREER MOVES

MCI Communications Corp. has named RICHARD A. BOLANDZ vice president of business strategy and technology. He will guide the relationship between MCI's business and technology-development and -deployment strategies.

LOUIS J.F. BOYLE has been appointed CIO at Computer Task Group Inc., an international IT services firm. Boyle will be responsible for establishing and implementing a corporate IS strategy.

OPEN ARCHITECTURE

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People First

Electronic communications can play a significant role in business partnerships, but first the fundamental human relationships must be in place

BY ROSABETH MOSS KANTER AND PAMELA A. YATSKO

Now that partnering is a fact of life for many businesses, communication tools such as groupware can be powerful aids to fast, real-time information exchange and response. Indeed, proponents of groupware argue that it provides the glue to bond suppliers, customers, distributors and venture partners in what Lotus Development Corp.'s Chairman and CEO Jim Manzi has dubbed an "electronic *keiretsu*," referring to the groups of allied companies common in Japan.

But computer systems cannot substitute for human systems, as we found in a four-year study of effective business collaborations in nearly 40 companies in the United States and around the world. Before an electronic *keiretsu* can create seamless operations among network partners, vital organizational and cultural issues must be addressed.

Shared Strategy and Approach

Network members need a common understanding of the relationship. Chief executives must discuss their business philosophies and goals face to face to make sure that shifts in one partner's strategy will not jeopardize their joint action. Companies that connect without sufficient ongoing discussion among senior managers may find later that their interests diverge, significantly harming the relationship if discovered too late. Honda, for example, saw its partnership with Rover undermined when parent British Aerospace decided to sell Rover to BMW.

Discussing strategy openly ensures that partners move in compatible directions. Before Digital Equipment Corp. forged electronic links with key suppliers, it gave them an unprecedented amount of information about its business to encourage them to design offerings to meet its future needs.

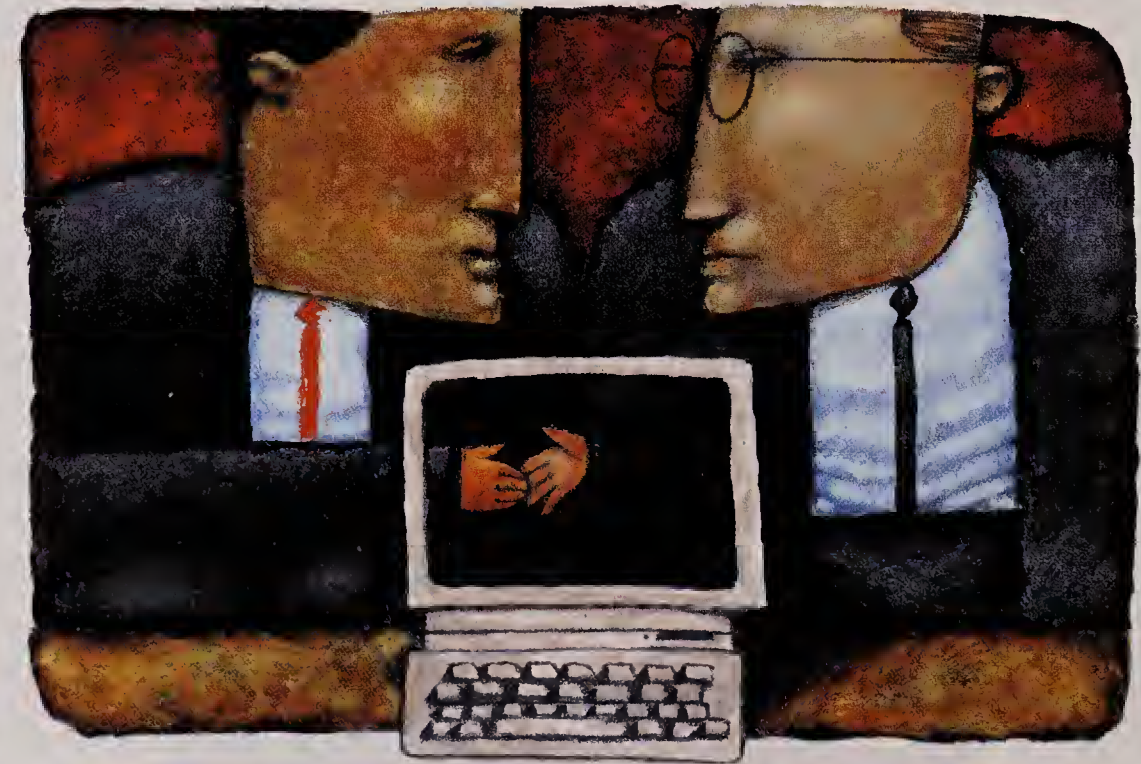

ILLUSTRATION BY TED PITTS

Long-Term Commitment

Partners that have made a long-term commitment to one another are more likely to act in ways that ensure the network's success. When there is a chance the union will not last, companies hedge their bets by limiting the money, top-management attention and staff time they are willing to invest. They make few internal changes to adapt to the other partners, and they keep their options open in regard to joining other, competing networks. Limiting what partners put into a relationship also limits what they are likely to get out of it.

Cooperation crumbled in an alliance between a North American equipment manufacturer and a large high-tech supplier because of uncertainty over the plans of each of the partners. One partner threatened to develop and distribute a competing product when managers thought the other partner was withholding its best technology from the joint venture. But that side's threat simply reinforced the other side's hedging.

OPEN NETWORKING

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Companies will not share information freely if they do not believe their partners are as committed as they are.

A Common Vocabulary

Before companies can begin sharing information productively, they need to speak the same corporate language. This goes beyond technical terms and systems; differences in organizational structures, decision-making methods and measurement systems can cause communication gaps and operating tensions. Intercompany product-development teams can founder on issues of compensation and career paths. A Xerox Corp. joint venture with Sun Microsystems Inc., for instance, involved engineers from both companies working under different bonus systems; Xerox decided to use Sun's system so that differing incentives would not cause engineers to set divergent priorities.

Cross-Functional Teamwork

Getting the most out of closer relationships with partners requires better and faster interfunctional coordination within each company, as well as collaboration across companies. A drugstore chain that used to buy from a large number of suppliers via its purchasing department now has closer relationships with a smaller supply base linked by electronic data interchange.

The CEO jokes that he used to have one chair in his office occasionally occupied by a supplier representative; now, he says, he needs more chairs, since people from multiple areas within each company are involved. He now leads discussions with suppliers that include marketing managers from each company hatching joint promotions, controllers discussing measurement needs and finance people debating billing terms and sharing of cost reductions.

Successful business networks have close interpersonal ties at many levels of the partner organizations. People from many functions and levels get to know each other on a personal basis, facilitating rapid problem solving and identification of potential synergies among partners. Digital, for example, augmented electronic links with key suppliers by developing regular in-person forums to review business plans and technology developments.

Relationships at many levels permit partners to shift activities among network members. British apparel supplier Cohen & Wilks International contributed programming expertise to improve the effectiveness of retailer BhS's electronic data-interchange system. Open-book sharing of financial accounts helped both companies budget more effectively and allowed Cohen & Wilks to offer the retailer a retroactive discount scheme based on high-volume orders. Cohen & Wilks took on some quality-control functions previously handled by BhS. And to aid speedy response throughout the supply chain, Cohen & Wilks helped BhS get to know its Asian manufacturing plants.

Coordination and cohesion can be improved by identifying "integrators" who are held accountable for the relationship itself, marshaling resources from any part of the network to improve performance.

Integrator Roles

Managers in each company in a partnership are responsible for the success of their own units, but who looks after the success of the network as a whole? Coordination and cohesion can be improved by identifying "integrators" who are held accountable for the relationship itself, marshaling resources from any part of the network to improve performance. AT&T's NCR unit created such roles as "Intel advocate" to champion Intel Corp.'s interests and capabilities from inside NCR; NCR was consequently first to market with a new product based on an Intel development.

In the global advertising-agency alliance between Foote, Cone, Belding and Publicis of France, worldwide account directors provide the glue that unites the network. They coordinate work across both companies' offices, mobilizing network resources on behalf of particular customers and solving problems arising among network members.

Empowerment of Representatives

Companies cannot take advantage of networks unless those people most involved in the team or partnership have the power to act on the information they exchange. At a minimum, they must be able to assess the significance of data and make commitments. Nothing frustrates partners more than waiting while the other representatives check back throughout the hierarchy before making a decision. Intercompany alliances as well as intracompany teams have often failed because people assigned to network responsibilities possessed greatly differing levels of authority.

A large computer company had disappointing results from nearly all of its partnerships with small technology providers because of empowerment problems within its own hierarchy. Its liaisons to the suppliers were middle-level bureaucrats who could handle only routine matters, while the smaller companies tended to involve senior people who could make decisions on the spot.

In short, before companies can exchange hard data, they must work on soft issues. Electronic relationships are only as effective as the human and organizational infrastructures behind them.

Rosabeth Moss Kanter holds the Class of 1960 Chair as professor at Harvard Business School. She is the author of When Giants Learn to Dance, The Challenge of Organizational Change *and other works. Pamela A. Yatsko is a former research associate at Harvard Business School.*

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TWICE-TOLD TALES

CIO has examined many companies embarking on extensive IS reorganizations or strategic-system implementations. But real life doesn't end at the bottom of a page, and long after those stories ran, their subjects have soldiered on with varying degrees of success. Here, we offer a progress report on three of those companies, to see how their plans have panned out over time.

BY MEGAN SANTOSUS

AMOCO: *Coming Back Full Circle*

When Amoco Corp. was profiled in *CIO*'s March 1992 issue, the oil and chemical company was pursuing a decidedly measured approach in its move to distributed computing. The Chicago-based company's efforts included conducting extensive pilot projects, relying on outside expertise and carefully choosing the most appropriate applications to move to a client/server environment. According to Jackie Ribich, corporate IS manager in charge of standards and technology back then, slow and steady progress was the key to achieving a delicate balance. "If we focused on getting as much done today as we could, we'd have chaos," she said at the time. "On the other hand, if we waited for the right infrastructure to develop applications, we'd never get anything done."

To facilitate application development, Amoco's centralized IS group was restructured into autonomous units aligned with operating companies. Half of the 2,000 IS personnel were transferred to business units, while those who remained on the

PHOTO BY GREG GILLIS

JACKIE RIBICH: *"Coming back full circle is one of the exciting things we're doing."*

central staff assumed advisory roles. "The idea," explained Ribich at the time, "was to decentralize development while retaining an important centralized function."

By the sound of things, Ribich and the rest of Amoco's IS group have been very busy since 1992. Significant progress has been made in implementing distributed scheduling and logistics systems at the refinery, terminal and service-station levels—and that's just for starters.

But while the company has maintained its methodical approach to developing distributed systems, some things have not gone as planned. Notably, the business-unit IS operations have been recentralized into a single, shared service unit: a 180-degree shift from its previous approach.

The recentralization is part of a corporatewide initiative. Amoco recently embarked on a major restructuring effort that replaced three of its subsidiaries with 17 business groups. Now the company wants to improve efficiency and effectiveness corporatewide by applying technology to business processes that are common across those groups. Ribich herself recently returned to corporate IS following a stint as manager of information systems at marketing subsidiary Amoco Oil Co., a position she assumed as part of the decentralization effort. "Coming back full circle is one of the exciting things that we're doing," she reports.

Even though decentralization is no more, IS staff gained valuable experience working on projects side by side with the management team, actively participating in strategic planning. "We found that distributed computing affected basic business processes out in the field," says Ribich. "This has made us start thinking of things from a process perspective."

Ribich expects application-development work in the newly reorganized IS group to continue much as it did in the days of decentralized operations. Conducting lots of pilot projects on a small scale prior to full implementation will still be the norm, as will partnering closely with business units. One thing that has changed significantly is that Amoco no longer looks to vendors and consultants as its sole sources of expertise. An extensive training curriculum and a concerted effort to develop competencies in project management and technical skills have brought in-house staffers up to speed. "In terms of standards and architecture, we do less development and more integrating pieces together, and we've been able to add competencies as we need them," Ribich explains.

Back in 1992, Amoco was holding off on some distributed applications until better, more-flexible CASE tools became available. That has yet to happen, but Ribich says many applications, such as E-mail and decision support, can be developed anyway. And Amoco is no longer waiting for tools. "CASE has disappeared from our lexicon," Ribich asserts.

As with any ambitious project, the move to distributed computing taught Amoco some valuable lessons. Consider, for example, the terminal automation system, a point-of-sale distributed system that automates the process of filling and dispatching tanker trucks. Work was halted during the pilot phase when a programmer in the field had to remove dead rabbits from a pipe. "With that pilot, we discovered early that support had to be designed right along with the system," says Ribich. "We learned that we need a whole plan of action, so we adopted a team approach to deal with the myriad problems that are bound to come up."

Each project has brought with it new ideas that Amoco has incorporated into its development process. One recent example is the Amoco Retail Systems Technology Architecture (ARSTA), a satellite-based proprietary network that's expected to be fully operational in 1995. Because 23 vendors are involved in putting ARSTA together, Amoco has set up a quality-assurance team and lab to make sure that integration and response times are up to snuff. "Everything now goes to the lab, whether it's a new credit-card reader for a pump or a new release of software," says Ribich. "ARSTA has brought with it an excellence for change management, testing and quality."

While distributed computing has won over many people at Amoco, some applications seem destined to remain on the mainframe. If there's one lesson that Ribich tries to instill in both her staff and corporate management, it's that distributed computing should only be attempted when there's a compelling business reason. "Doing it just because it's the bandwagon doesn't make sense." ■

GPU NUCLEAR: *More Power to the People*

The 1979 accident that overheated and destroyed one of the nuclear cores at Three Mile Island (TMI) was an alarm in the night for many people. During the 1970s, the company's IS organization had devoted little attention to improving plant conditions or generating electricity, concentrating instead on administrative and business areas. But the accident dramatically demonstrated just how confusing—and dangerous—poor information flow could be, as operators in the control room were bombarded with alarms and overwhelmed with reams of paper printouts.

After the incident, General Public Utilities Corp. (GPU), of Parsippany,

DAVID MARLEY: *"We have much more information to observe plant conditions."*

PHOTO BY EUGENE MOPSIK

N.J., formed subsidiary GPU Nuclear Corp. to take over operation of the plant, and in 1982 David Marley came on board. "GPU recognized that information technology was going to be important to TMI's comeback," said Marley in a May 1, 1993, cover story.

Accordingly, the IS staff was redirected to "invest most of our resources on the nuclear and generation side," said Marley, client services director in charge of IS since 1991. The fruits of their labors included the Plant Performance Monitor (PPM), a system that provides data from instruments hard-wired to the central computer in real-time, and Operator Tour, a handheld computer-based system that gathers data from 1,000 standalone instruments throughout the plant.

Today, Marley and the IS division are occupied with both the old and the new. While existing systems are undergoing major enhancements, new applications are being developed throughout GPU's five operating companies in an effort to position the utility company for a deregulated future that promises intense competition. "As competition in the utility industry really comes into play, we've got to figure out how we can use technology to [reduce] costs and improve productivity at the plants," says Marley.

As far as the old is concerned, much has happened in the year and a half since *CIO* paid a visit to TMI near Harrisburg, Pa. The PPM system, which automatically updated 1,000 instrument data points at the TMI power plant every three minutes, now handles 1,500 every second, thanks to a high-speed data link. "We have much more information to observe plant conditions, which gives us a finer granularity to events as they happen," Marley says. In addition, Microsoft Windows-based graphical front ends now give plant operators increased flexibility to customize their own output graphs.

In 1993, Marley was hopeful that the PPM could be marketed externally and thereby turned into a moneymaker for GPU. While this hasn't happened as quickly as he expected, Marley believes that a Windows-based version of the system will enhance its marketability.

Like the PPM, Operator Tour has been ported to Windows, and the handheld devices that operators use to collect data from bar-coded instruments have recently been upgraded. Operators will need that increased functionality now that all 30,000 of TMI's plant components have been equipped with bar codes as was originally planned. While moving some character-based applications to GUIs has given user-friendliness a boost, IS must now support an environment split between OS/2 and Windows. But Marley is convinced that his staff can handle it. "We've developed internal expertise with Windows-based development and support," he reports.

Internal IS expertise is continually being called upon as GPU seeks to raise the bar on efficiency, productiv-

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ity and safety. The IS group is experimenting with client/server front ends such as IBM Corp.'s DB2 and is considering replacing a mainframe-based scheduling and cost-control system with a client/server model. An automated access-control system for use in restricted plant areas is also in the works; the aim is to improve the timeliness of information and reduce the need for manpower support by providing workers with access badges that link directly into the mainframe. Maintenance applications and systems integrations remain priorities at the Oyster Creek plant in New Jersey, where a $14 million training simulator tied to the PPM recently went online to join a similar facility at TMI.

But it's the new projects that are currently getting the most attention from the rest of the company. With deregulation looming in 1998, IS is actively helping GPU realize a strategic vision that emphasizes teamwork and communication. In 1991, 400 employees within the IS division began using Lotus Notes to see how it could be implemented throughout the corporation. Today, 2,000 people use Notes companywide, according to Ted Pichalski, an application developer in Parsippany. Notes "is a tool we provide to our geographically dispersed clients that allows them to work as teams," he says. It fosters group discussions, facilitates brainstorming and improves communication throughout the company.

GPU already has more than 750 Notes applications written in-house. Third-party services such as imaging and online news wires are being considered, with users clamoring for more applications. "The initial enthusiasm for Notes came from IS, but now it's coming from our clients," says Pichalski. He agrees with Marley that satisfying user requests alone may be enough to keep IS busy for quite some time. ■

JANUS CAPITAL: *A More Moderate Pace*

At the beginning of 1990, mutual-fund investment firm Janus Capital Corp. experienced a phenomenal upsurge in business. Investor accounts swelled from 100,000 to 1.4 million in 1992, with managed assets increasing sixfold to $15 billion. "Fund performance brings in new shareholders," explained Executive Vice President of Operations Margie Hurd in an April 15, 1993, article, "and it's service that makes the difference in retaining them."

But growing so quickly placed an extraordinary burden on the Denver-based company's customer-service capabilities. If the growth continued without an infrastructure strong enough to support it, Janus might have been saddled with thousands of dissatisfied customers—and the boom would have become a bust in short order. That didn't happen, thanks in large part to an IS department that worked overtime to facilitate a move to new quarters, hard wire desktops for an influx of employees and roll out systems to ensure that Janus could provide the level of service that customers expected. "Considering the size of the task, I think IS did an excellent job," Hurd said at the time. "They'd make great firefighters."

Business is still on the rise at Janus, but growth has slowed to a "much more manageable pace," according to Hurd. Since last year, investor accounts have increased to 1.9 million while managed assets now total $22 billion. Yet the IS department—which has doubled in size to 50 employees—still has plenty of projects on its plate. Says MIS Operations Manager Ken Carpinello, "We're still in a catch-up mode in that we're trying to put information on people's desktops."

Carpinello is no longer looking for a management software product to monitor and diagnose problems with the company's network, which has expanded from 550 to 850 nodes. "We came to the realization that there is not one product out there that could do what we wanted," he says. "So, we've broken up the network into subnetworks because it's easier to manage." Since any one piece of the network now relies less on other pieces, for example, fixing a problem requires the attention of fewer people.

Enhancing customer service remains a priority, and the IS department is continually looking at applications and systems to give the company an edge. An OS/2-based document-imaging system has been rolled out to telephone representatives, and the learning curve—which presented a significant challenge in 1993—is no longer a problem thanks to an in-house training curriculum and the development of internal expertise for ongoing support.

Janus continues to work with DST Systems of Kansas City, Mo., on outsourcing host-based systems administration and new-systems development. An interactive, desktop forecasting application called Financial Asset Builder (FAB) from DST is being piloted at one of the service centers in Denver. FAB will allow customers to better plan their investment strategies by forecasting how much they will need to invest on a

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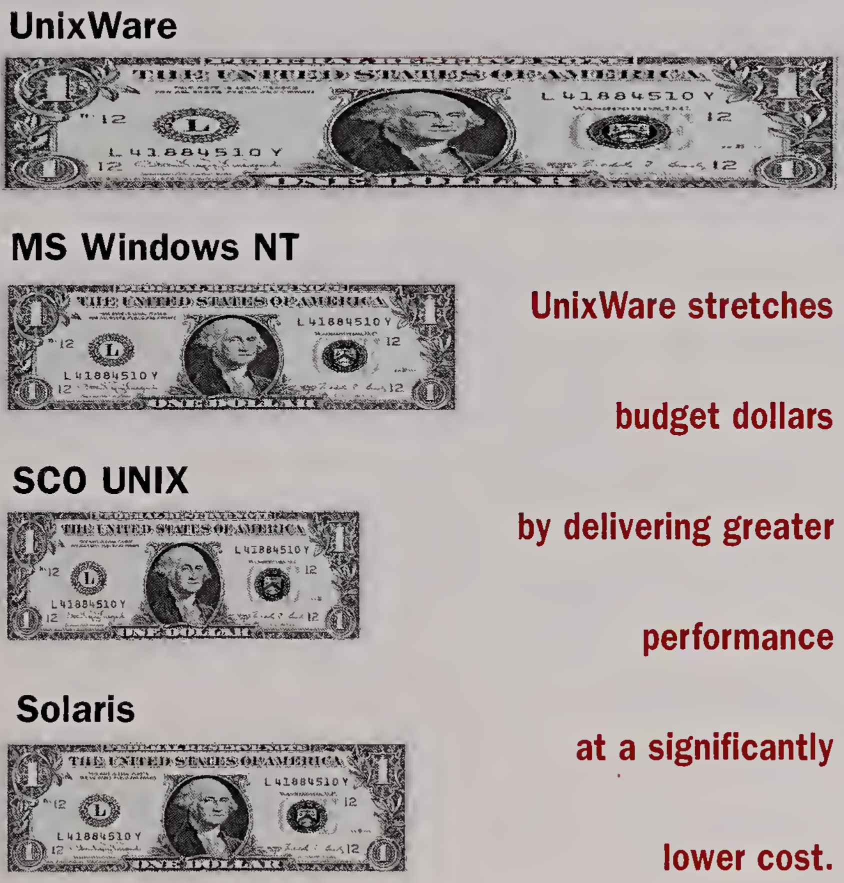

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KEN CARPINELLO *and* **MARGIE HURD:** *Now IS can concentrate on preventing fires rather than fighting them.*

PHOTO BY BILL FARRELL

monthly basis to achieve their long-term goals. Eventually FAB will run on a PC network, probably for use in walk-in centers. "We're still evaluating whether we can work it into a telephone conversation," says Hurd. "But it's probably too complex to put on everyone's workstation."

The IS group has also been looking at applications that will increase the productivity of employees. It recently implemented a new trading system that automatically alerts a representative when compliance restrictions are violated. Previously, compliance violations were discovered the day after trades occurred. Now representatives are aware of a violation upfront and no longer have to do any "policing" after a trade. Also in the works is a portfolio-management system to provide representatives with access to a variety of systems in an open environment.

Janus now employs 750 people, up from about 500 in 1993. To accommodate them, the company acquired an additional 57,000-square-foot facility in Denver that houses customer- and telephone-service operations. For Carpinello and his staff, relocating employees and linking the new facility to Janus's existing network was much easier this time around. During the company's first relocation, the plan called for moving employees while simultaneously switching from dumb terminals to 400 networked workstations—all in five days. Invariably, the tight schedule proved impossible to meet. But Carpinello learned a lot from the experience, and this time "we built a lot more leeway into the schedule, so it didn't come down to the wire," he says. "We gave ourselves about a week to move everything in and get networked and another two weeks to troubleshoot."

When Janus was in the midst of its growth spurt, management relied on IS to quench the fires of an impending crisis. As the company continues to thrive, IS is now in a position to act as an enabler. Declares Hurd, "IS now can spend its time preventing fires rather than fighting them." CIO

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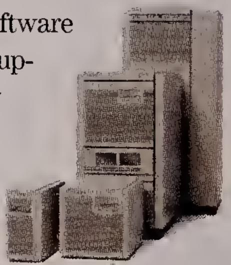

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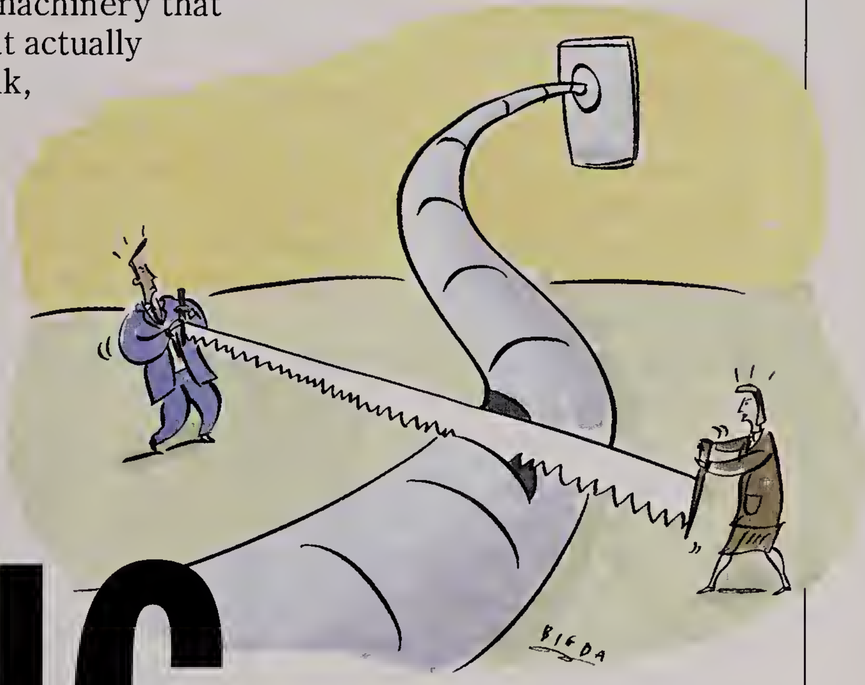
GETTING UNWIRED

BY CAROL HILDEBRAND

Anyone exploring the options in wireless technology today is faced with an experience much like taking one of those see-the-future rides at Disney's Epcot Center. All the gee-whiz gizmos highlighted in the dioramas are certainly tempting, but the clanking machinery that powers the ride serves as a constant reminder that what actually gets most jobs done is still technology of a different ilk, proven and reliable.



Hype about wireless technology abounds. From CDPD to PCS, the acronyms are flying fast and furious, and vendors are sketching *Jetsons*-like scenarios of mobile companies using wireless technology to ratchet up their competitiveness.

But industry hype is not always followed by corporate purchases. Cellular telephony, the earliest wireless technology, has indeed been widely embraced (there are about 18 million subscribers nationwide), and electronic pagers seem nearly as ubiquitous. However, wireless use has not really spread beyond its role as a voice-communications conduit in corporate America. Technologies designed to support white-collar workers and their applications, such as mobile-data networks and wireless modems, have not been gulped down quite as voraciously as were these communications boosters. So, while today's mobile professionals come loaded with flip phones and pagers, corporations are not designing their enterprisewide business applications around wireless technology.

"Almost nobody is using wireless as a white-collar productivity enhancer," says Ken Dulaney, vice president of mobile business strategies at the Gartner Group Inc., a market-research firm in Santa Clara, Calif. Paul Callahan, senior analyst at Forrester Research Inc. in Cambridge, Mass., agrees. When it comes to office applications, he says, "wireless has a long way to go. It's really not appropriate technology for office workers yet."

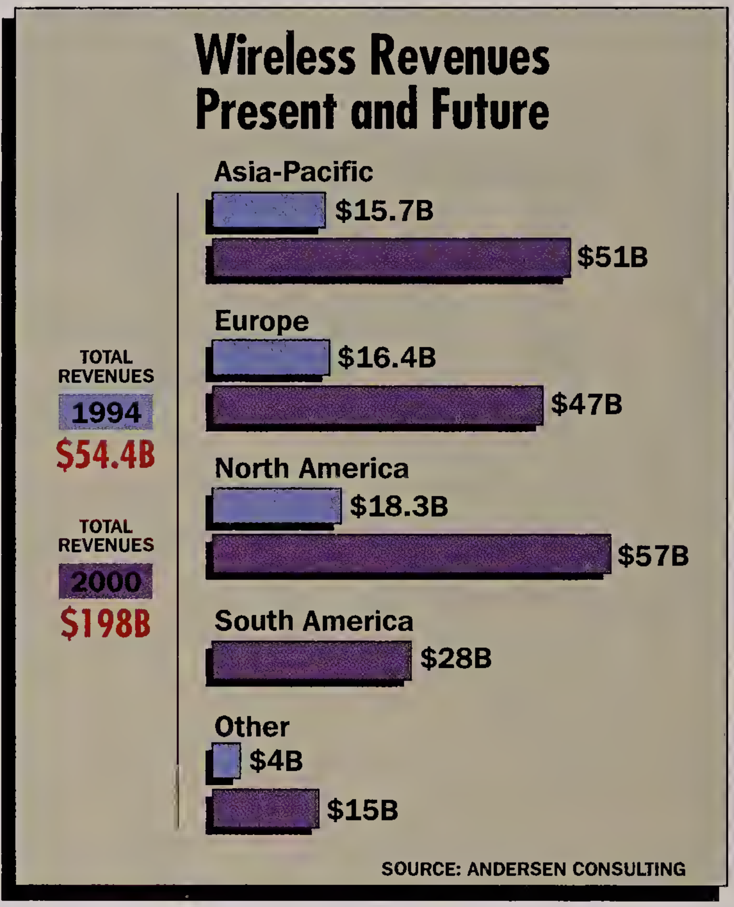
Companies considering wireless applications have a couple of transmission options: cellular and data-only services such as those offered by ARDIS and RAM Mobile Data USA Limited Partnership. Both use radio

Though wireless technology is still used primarily for voice communications, some companies are using it for strategic business applications. Their consensus: The implementation pain is real, but it can be worth it.

ILLUSTRATION BY DIANE BIGDA

frequencies to send signals, but cellular companies transmit with one continuous connection and send both voice and data. The data-service companies, on the other hand, send their information digitally in small bursts, or packets; this is faster, cheaper and more secure than analog cellular transmission. A forthcoming new technology called cellular digital packet data (CDPD) will both digitize and packetize cellular transmissions and should prove a threat to data-only services, analysts say.

A number of technology issues are currently conspiring to make implementation of such systems difficult, however. Businesses must overcome these hurdles if they wish to build strategic systems using wireless technologies, says Bill Frezza, president of Wireless Computing Associates, a consultancy in Yardley, Pa.


Wireless Revenues Present and Future

SOURCE: ANDERSEN CONSULTING

Analysts cite the following four big bugbears:

■ **Slow data throughput**—Wireless data-transmission rates top out at 4,800 to 9,600 baud, which lags far behind the almost-instantaneous transmission rates of a traditional network, says Richard Siber, director of wireless communications at Andersen Consulting in Boston. These slow rates are adequate for small transmissions such as E-mail or credit-card verification, but files of 20KB or more are too bulky to send. The bottom line, says Frezza, is if you have large amounts of data to send, "find a phone jack."

■ **Skimpy network coverage**—Taken as a whole, cellular companies have nationwide coverage. However, there are no integrated "roaming" agreements among the companies. If a user's home-base vendor has no agreement with a vendor in another region, hefty surcharges appear on the bill. Data-transmission network providers such as ARDIS and RAM Mobile Data say they cover 80 percent of the business market, but that covers mostly urban areas. Neither can offer nationwide coverage.

■ **Cost**—"Cellular air time is still very expensive, and the cost has not been going down," says Mark Lowenstein, director of wireless/mobile research at The Yankee Group in Boston. On the other hand, RAM and ARDIS offer a variety of attractive pricing schemes, from flat rate to per packet. Wireless hardware prices also need to come down to a consumer level.

■ **Bulky hardware**—While today's technology works, it needs streamlining ("Wireless modems are like bricks," Frezza says), particularly at today's high price point. British Airways PLC uses a wireless application to speed check-in procedures for high-profile customers. The application helped boost "premium traffic" by 6 percent, which in turn added to the airline's industry-trend-bucking $423 million profit for 1993. But users have to wear the wireless modem in a harness around their shoulders, says Gary Barnhart, U.S. business manager for the airline.

Nevertheless, enthusiasts should not despair: Several trends indicate that the outlook is getting better. First, the regulatory climate for radio-frequency data transmission is improving as the FCC opens new radio-frequency spectrums for commercial use. This will also broaden the market for personal communications services (PCS), which will provide a one-stop number for paging, voice, E-mail access and data transmissions. In addition, Callahan points out that CDPD is emerging as a de facto standard for sending data over cellular networks; with most cellular carriers equipped to handle CDPD, nationwide coverage for data transmission will finally become a reality.

"We've seen explosive growth in technology advancements," says Siber.

Still, Siber's sales forecast for the wireless industry shows that it will take another five years for this market to really take off (see chart). Similarly, a recent white paper from The Yankee Group predicts that the wireless market has only just emerged from its "pre-takeoff" stage and will not drive general-purpose applications for another two years.

Take the case of Individual Inc., a customized-news provider based in Cambridge, Mass. The firm has been offering its HeadsUp daily customized news-brief service via Motorola Inc.'s EMBARC wireless network for about a year, but only about 100 of its 4,000 HeadsUp subscribers take advantage of the wireless-distribution mechanism. Jim Leightheiser, product manager for HeadsUp, acknowledges that his company is early to the party when it comes to wireless. "There's been so much written that expectations are sky-high, but the reality hasn't quite caught up yet," he says.

While implementing wireless technology is not yet at the critical mass of mainstream acceptance, analysts say, there are areas where early adoption of a wire-free system merits consideration. Companies turn to wireless technology only when it is critical to survival, says Frezza. He points to United Parcel Service of America Inc.'s wireless package-tracking application (profiled on Page 43) as a prime example. "UPS did what they did because they had to. Without the ability to track traffic, FedEx was going to eat their lunch," he says.

Strategic wireless applications are most often used by two groups: field-service representatives and salespeople. According to Callahan, both share "the two things that we found justify use of wireless. First, users must be constantly in motion on the job; and secondly, they need to be constantly in touch with rapidly changing data." Companies that invest $200 to $259 a month per user on wireless, as The Yankee Group estimates is typical, can justify the price by the corresponding increase in the quality of their customer service.

Clearly, companies willing to go through the process of implementing an immature technology are looking for a big return—or just survival. The pain, however, is also significant. Most pioneers in the field report satisfactory payback, but as the following profiles illustrate, going wireless does not mean a company won't tangle with trouble.

DAVID JENSEN *(left) and* **JOE MANNING** *acknowledge the limitations of current wireless systems.*

Wilson Sporting Goods Co. Golf Division

Chicago

Application: *Wireless sales-force-automation package*

Implementation drawbacks: *Inadequate radio-frequency network coverage; clunky add-on technology*

Wilson Sporting Goods Co.'s golf division teed off on wireless for its sales force in July 1993. While salespeople tout the competitive edge that they've gained, they also agree with MIS folks that using wireless can be almost as frustrating as hitting out of a sand trap.

Using radio-frequency modems attached to their laptops, the 50-odd salespeople access the company mainframe via the ARDIS network and can check inventory and customer credit information, place orders and get an immediate confirmation. Before the advent of wireless, they downloaded inventory and customer files onto laptops before hitting the road; since inventory fluctuates continuously, that meant that by the end of a week-long road trip, they were relying on inaccurate data.

Pro Golf Sales Representative Mike Auger says that his access to real-time information has been a big selling point. "My customers can see the inventory numbers changing right on my laptop; it makes them feel more confident in the information I'm giving them." On-the-spot ordering also cuts several days out of the order cycle and speeds invoicing and shipping.

David Jensen, national sales manager for the pro golf division, says that the wireless application does give the 80-year-old company a competitive advantage, but he also acknowledges the limitations of the systems. "If you're a guy covering North and South Dakota, you are not going to get good coverage—either cellular or data," he says. Conse-

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quently, some salespeople will revert to dialing in daily for information, losing that real-time edge.

Joe Manning, MIS supervisor at the golf division, says that the company is re-evaluating its commitment to the technology. According to Manning, Wilson's other two divisions have already dropped their fledgling wireless projects. He blames both skimpy coverage and clunky technology, as well as some reluctance among salespeople to try new technology. In addition, some salespeople don't like lugging around the modem, which is about half the size of a typical package of golf balls. "It's an external RF device you have to plug in," he says. "For sales reps, it's just one extra thing to tangle with."

Automatic Data Processing
Claims Solutions Group

San Ramon, Calif.

Application: *PenPro, a standalone automotive-claims-adjustment package*

Implementation drawbacks: *Not-ready-for-prime-time hardware*

GERHARD BLENDSTRUP: *Waiting for improvements in wireless-modem technology.*

PHOTO BY DAVID POWERS

ADP's Claims Solutions Group (CSG) sells claims-adjustment software to most of the major auto insurers in the country. The software, called PenPro, helps insurers develop estimates and also provides easy wireless access to ADP's database of used and salvaged car parts and locations, consisting of an inventory of 800 salvage yards. However, improved wireless technology would make that access even more attractive, says Gerhard Blendstrup, senior vice president of strategic services.

The application resides on claims adjusters' laptops and connects via a wireless modem and circuit-switched cellular service to CSG's database, which contains millions of bits of information about car parts, such as availability, parts descriptions and labor prices. Claims adjusters use PenPro in the field to calculate claims immediately rather than going back to the office to work on forms. The database changes too fast to be put on the laptop (Blendstrup says that the inventory of those 800 salvage yards is updated every night), so adjusters have to access the host remotely.

Since CSG receives a service fee every time an adjuster uses the database, Blendstrup insists access should be as transparent as possible. "The adjuster should not have to worry about getting the information or where it is coming from," he says.

Nor should adjusters have to worry about network coverage, hardware battery life or the other inconveniences that go along with wireless technology. This is where Blendstrup has a bone to pick with wireless: The modems are too big to be integrated into the laptop. CSG currently uses a Personal Computer Memory Card International Association (PCMCIA) modem, but Blendstrup hopes to switch to something else in the near future. "I want the hardware to disappear; it should be part of the application instead of a separate entity," he says. "I'm looking for something I can slip into a laptop that doesn't interfere with a machine, doesn't break, isn't the weakest link in the setup and has to be under $100."

Blendstrup has also experimented with sending information via data-only networks such as ARDIS and RAM Mobile Data but reluctantly returned to cellular service. Although he found data-transmission networks more reliable, "the big issue is still coverage," he says. He expects that will eventually be rectified, but it means another wait. "Mostly, though, we're waiting for hardware improvements," he says.

United Parcel Service of America Inc.

Atlanta

Application: *TotalTrack, an integrated package-tracking system serving the United States and Canada*

Implementation drawback: *Cellular companies do not offer a seamless nationwide network—UPS had to create its own*

The impetus behind UPS's package-tracking application was simple: survival. "The driver for this was to exceed the [tracking offerings] of the competitive services," says Douglas Fields, the company's vice president of telecommunications for information services. Translation: Federal Express Corp.'s private radio-based tracking network was cleaning UPS's clock, and Big Brown had to have an answer.

And what an answer it is: Andersen Consulting's Siber calls UPS the largest mobile-data user in the world. The company's TotalTrack cellular system is installed in approximately 50,000 UPS vehicles, and drivers using it make about 750,000 calls daily. And, Fields says, UPS is winning business from competitors: "Our air volume went up about 25 percent last year, and we attribute it to TotalTrack."

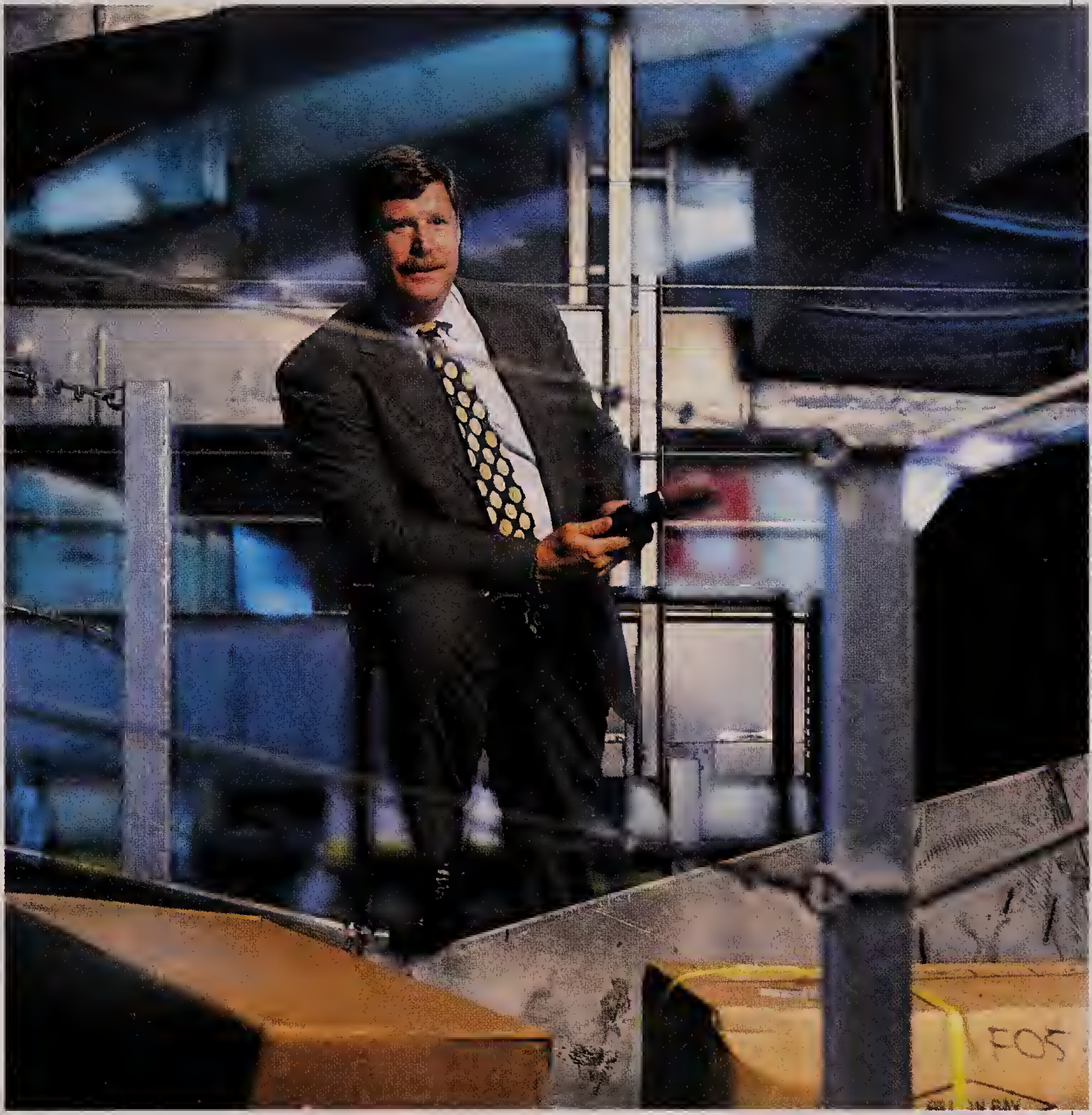
If UPS has delivered a package to you since February 1993, you've seen TotalTrack in action. All drivers carry an electronic clipboard; when they deliver a package, they scan the bar-coded label on it and have the customer sign for the package on the clipboard using a pen-based interface. These actions capture the signature and information such as the time of day, the driver's name and the delivery-route number. Once the driver gets back on the road, he or she puts the clipboard in a customized adapter with a cellular modem. This unit calls the cellular-switching service, which forwards the call to UPS's private network. The driver gets an electronic verification, and the package data heads for UPS's 8.9-terabyte database. The whole process takes about 11 seconds, Fields says.

An application built on such a grand scale ($150 million) takes years of planning, and UPS was also stymied by the absence of an integrated nationwide cellular network. To make TotalTrack work, the company had to build its own alliance by corralling more than 70 different cellular carriers into agreement on pricing and billing procedures. The carriers have formed a consortium that sends UPS a single bill and disburses payments to all the participants.

Getting price concessions from cellular companies is not easy; with a market growing at 30 percent yearly, according to The Yankee Group's Lowenstein, there is little incentive to lower prices. In fact, "it required a heretofore unprecedented amount of cooperation among cellular carriers," says Fields.

But UPS had size on its side, says Frezza. "UPS is one of the only companies with the kind of clout to make this happen. Because of the anticipated volume of calls, they could walk up to the cell industry and say, 'You will do the following, and we'll put 50,000 phones in the trucks.' "

With TotalTrack charting a successful course for the tightest ship in the shipping business, Fields can say he had a dream come true: "I've always dreamed of a huge project with overwhelming odds, and I got one."



DOUGLAS FIELDS: *"Our air volume went up about 25 percent last year, and we attribute it to TotalTrack."*

PHOTO BY JOHN RAE

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THE EASTERN FRONT

It's not easy to find a Japanese CIO. That's because the concept of chief information officer, as we know it in the United States, does not really exist in corporate Japan. In their consensus-driven society and corporate cultures, Japanese executives say it would be extremely difficult to charge any one person with the taxing duties of a CIO.

Indeed, over the years Japanese companies have taken a dramatically different approach than American companies to deciding how to manage information systems and which new technologies to adopt. Often the Japanese prefer to divide the duties of a CIO among several senior managers. Sometimes they farm out those responsibilities to consultants who specialize in making information-management decisions. Or a company may create a separate subsidiary just to handle its information, data systems and technology needs.

But whoever carries out the duties of a CIO in Japan, that amorphous role is becoming increasingly important. The worst recession in the country's postwar history has forced companies to rethink how they use and manage information and technology in the workplace. Economists are still debating just when the Japanese economy will fully recover, but most agree that a resurgence in corporate profits will come not from squeezing more production out of already state-of-the-art factories, but from increasing productivity and efficiency in corporate offices.

A quick tour of an office of the Nikko Securities Co. Ltd., one of Japan's largest brokerages, provides a snapshot of the typical Japanese workplace. In big, open, smoke-filled rooms, long rows of gray desks face each other. This configuration not only eliminates fights over choice offices but also makes it impossible for the staff to avoid the boss's watchful eye. Standard office equipment includes the latest facsimile machines and copiers, but a personal computer on the desktop is extremely rare. Usually a group of employees shares one word processor. The Japanese rely heavily on communication by facsimile because their language, with its thousands of

STORYLINE

The Japanese approach to using and managing information technology in the workplace differs dramatically from that of the United States. But now that the worst recession in Japan's postwar history has forced companies to rethink their approach to IT, they are closely studying U.S. practices, hoping to emulate successful strategies while avoiding the pitfalls. And while it's hard to measure just how well the Japanese are doing, it's clear that their success or failure will be a significant factor in their future international competitiveness.

BY KATHRYN GRAVEN

JUNKYO FUJIEDA: *A CIO in Japan would build a consensus on IT strategy and make recommendations to the board.*

ideographs, is easier to write longhand than to type on cumbersome Japanese word processors. Electronic mail? That is still something of the future.

If this doesn't fit your mental image of the mean and lean Japanese firm, maybe that's because you're thinking of Japanese factories. For the past two decades, Japanese factories have won worldwide admiration and praise for their ability to churn out high-quality products, using high-tech production methods with robotlike efficiency. Their successes have inspired managers around the world to study and copy Japanese production systems.

But these blue-collar triumphs, and the massive amounts of yen they generated, also allowed Japan's white-collar workers to resist moving into the electronic-office age of the 1990s. As long as profits rolled in, no one seemed to care how many people it took to produce routine office reports. As a spokeswoman for Sony Corp., the consumer electronics giant, puts it: "When it comes to office automation, we're still in the dinosaur age."

SINCE THE BURSTING OF Japan's economic bubble in 1991, however, Japanese firms in all industries—from securities to autos

PHOTO BY HANS SAUTTER / LIAISON INTERNATIONAL

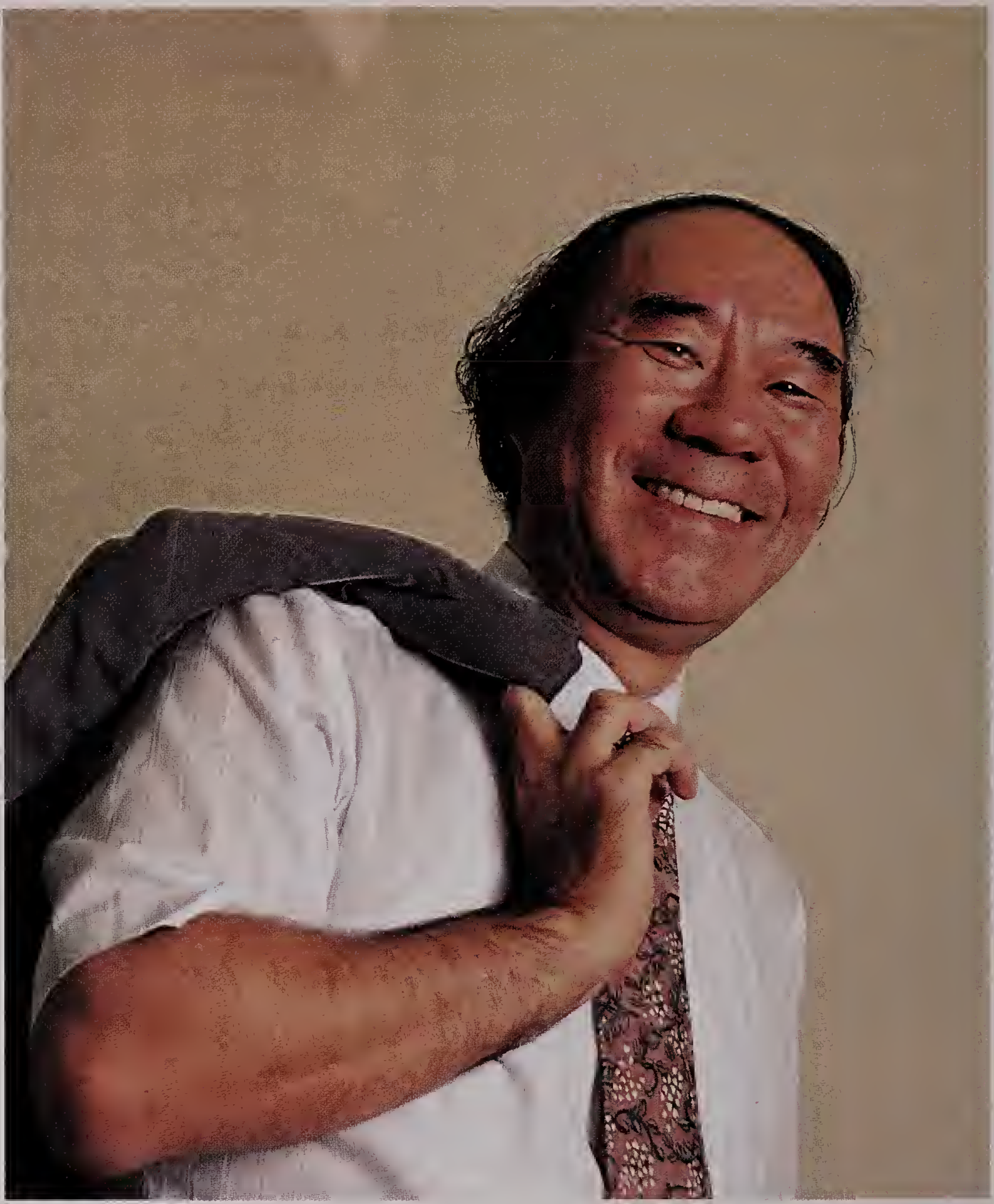
to pharmaceuticals and consumer products—have been shocked into paying closer attention to the bottom line. Looking for new ways to cut costs, many have begun studying and experimenting with American information-management systems and methods. "We are very far behind the U.S. in managing information systems," says Kiyoshi Asakawa, a general manager at Nikko.

Their ultimate aim, executives say, is to adopt some of the most successful management concepts and strategies. Reengineering and downsizing are two of the most popular buzzwords now in Japanese management circles. Bookstores are filled with titles—which Japanese managers are flocking to buy—that claim to have figured out how technology can be used to reengineer the way people work, including everything from leading-edge networking technologies to new production systems.

But at the same time, Japanese businesses want to avoid the costly pitfalls of bringing in new technologies that nobody really wants or uses. And they are extremely cautious when it comes to downsizing, afraid to disturb the time-honored employment practices and hierarchical relationships that dominate their workplaces.

No matter what course the Japanese chart, clearly the stakes are high. Analysts say just how quickly and well the Japanese can incorporate new technology and information-management systems into their white-collar world will be a significant factor in their international competitiveness in coming years.

"If Japan does not do it, it will fall behind the U.S.," says William Sterling, first vice president and an international economist at Merrill Lynch & Co. Inc. in New York. Sterling adds that the loss for Japan could be greater than just a lag in office efficiency. Information technology has not only put the U.S. on a path to greater productivity, it has been a catalyst for the development of new technologies. "The fear for Japan is that if they don't make up for lost ground in information technology, they could get caught in a high-tech/low-tech squeeze," says Sterling, with the United States dominating in advanced technologies and countries like China dominating low-end manufacturing.



KIYOSHI ASAKAWA: *"We are very far behind the U.S. in managing information systems."*

PHOTO BY TAKESHI YUZAWA / LIAISON INTERNATIONAL

Leading the way in IT advancement is Shiseido Co. Ltd. Japan's oldest and largest cosmetics company has long been on the cutting edge of incorporating Western technology and management concepts into its otherwise very Japanese operations. But today, even Shiseido is struggling to find a balance that will work for the 1990s.

> "The demand for change is coming from the bottom up."
>
> *–Kiyoshi Asakawa*

Founded in 1872 as Japan's first Western-style pharmacy, the company is located in the posh Ginza district of Tokyo. Now a household word in Japan, Shiseido boasts annual worldwide sales of about $4.9 billion. In addition to its state-of-the-art research facilities and factories, the company attributes much of its success to a relatively early embrace of computers and networked systems in its corporate offices. Shiseido started using IBM computers in 1957—well ahead of other Japanese companies—to track orders, plan products and handle logistical operations. During the 1960s and 1970s, the company computerized the distribution network for its core products. And, in the 1980s, it imple-

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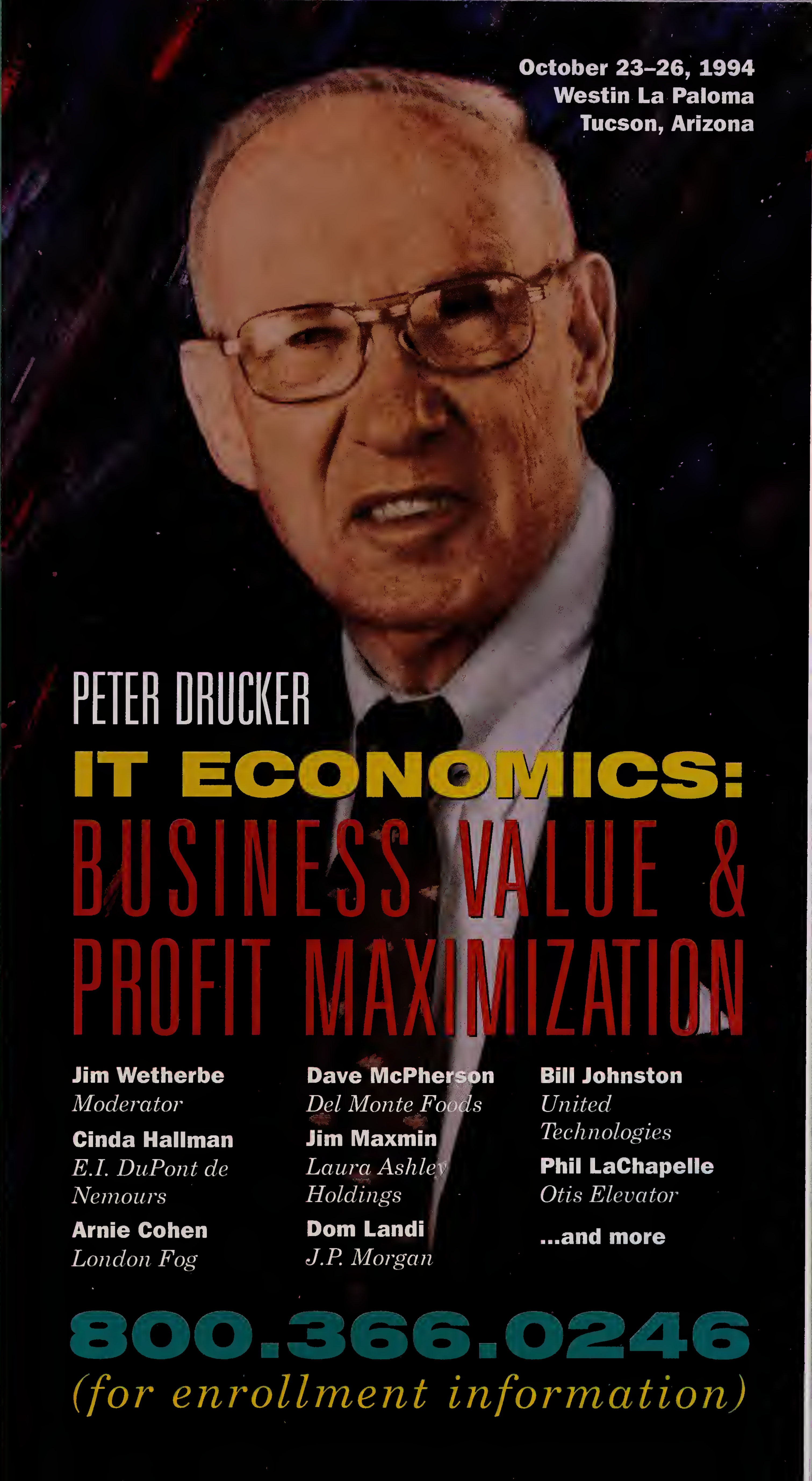

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"The fear for Japan is that if they don't make up for lost ground in information technology, they could get caught in a high-tech/ low-tech squeeze."
–William Sterling

mented an advanced internal corporate communication system, called Total Office Support System (TOSS), along with a value-added network to track sales at its major outlets. "Our corporate culture has always been a mix of modern science with Japanese business practices," says Shinsaku Sugiyama, manager of Shiseido's public-relations department.

Yet the closest person Shiseido has to a CIO is Toshiyuki Mori, an executive director in charge of the company's internal and external communications. Today, one of his main jobs is to raise office productivity and efficiency. But, other than voting at board meetings, he has little say in technology-investment decisions. (Those financial decisions fall to another executive director in charge of systems engineering.)

Mori's strategy is more new age than electronic age. After some 38 years with Shiseido, he has come to believe that the key to greater productivity is better communication. "Of course we have to be prepared to manage the technologies of the future," Mori says. "But efficiency alone would make us a cold company. Heart-to-heart communication is so important."

So, like many executives of his generation, Mori continues to rely on face-to-face meetings to disseminate information and make decisions. (He has, however, braved an experiment in videoconferencing with the Osaka office as a way to trim travel costs.) Mori says he can use the personal computer on his desk, but he admits that most senior managers have a "serious allergy" to computers that prevents them from ever touching a finger to a keyboard. He knows that reducing the number of employees through increased automation would solve a lot of his problems, but the lifetime-employment pact that has been part of Shiseido's and most other large Japanese companies' tradition is hard to break. Sorting this all out, Mori says, "is going to take a long time."

Meanwhile, however, the younger generation of Shiseido managers is growing impatient for change. To Sugiyama, the direction in which Shiseido should head is clear: greater use of office automation and a reduction in redundant workers. Sugiyama says he is not afraid of these changes. He eagerly demonstrates how his IBM Corp. ThinkPad, connected to TOSS, allows him to check on the up-to-the-minute whereabouts of other company executives, as well as the latest point-of-sale data for key Shiseido products.

Sugiyama is keenly aware of the information technology gap between Japan and other advanced industrialized countries. For example, while he was stationed in London, Sugiyama says he successfully introduced an electronic-mail system to the branch office there. The British employees loved it. Back at Tokyo headquarters, however, E-mail hasn't even gained a toehold.

TOSHIYUKI MORI: *Most senior managers have a "serious allergy" to computers that prevents them from ever touching a finger to a keyboard.*

PHOTO COMPLIMENTS OF SHISEIDO CO. LTD

ALLEN MINER: *For the Japanese, the time spent studying a technology is critical .*

> "Of course we have to be prepared to manage the technologies of the future. But efficiency alone would make us a cold company. Heart-to-heart communication is so important."
>
> *–Toshiyuki Mori*

ANOTHER EXAMPLE OF A Japanese firm caught in the technology and information generation gap—with no one person leading the way out—is Nikko Securities. One midlevel Nikko employee sums up the problem with this story: A co-worker asks his boss for permission to buy some software for his personal computer. The boss replies, "I thought we just bought you a new computer." The young employee responds that he needs software, not a computer. But his boss doesn't see the difference. "These senior guys just don't get it," says the employee.

Of course, Nikko, which ranks as one of Japan's top four brokerages with more than 11,000 employees, some 134 branch offices throughout Japan and a vast overseas network, is hardly stuck in the technology dark ages. As brokerage firms in Japan go, it has one of the more advanced mainframe systems for processing customer transactions and storing financial-market data.

But Asakawa admits that Nikko is still playing catch-up with its counterparts on Wall Street. He argues that the dramatic plunge in Tokyo share prices—a 60 percent drop from the end of 1989 until August 1992—slowed Nikko's stride. The relatively slow development of Japan's financial markets hasn't helped Japanese bro-

PHOTO BY TAKESHI YUZAWA / LIAISON INTERNATIONAL

kerage firms either. For example, until recently brokers could only issue buy recommendations, giving them little incentive to generate value-added advice. Now, however, they are able to use a new rating system that gives them the freedom to suggest that customers buy, sell or hold shares. In addition, financial-market deregulation has allowed firms to offer a whole new range of financial products. The result, says Asakawa: Nikko is feeling the pressure to move ahead with innovative investment technology that can help the firm design sophisticated new investment products, as well as to manage customer accounts in a more efficient way.

Years ago Nikko, like many other Japanese firms, determined that the rapid pace of technological change meant that technology experts needed their own separate corporate structure. Because large Japanese corporations typically hire recent college graduates and then rotate them through various divisions in the company as part of rigorous on-the-job training, a separate entity seemed the best way to ensure that a systems engineer, for example, didn't have to spend time in a branch office selling stocks.

Now the company relies on a wholly owned subsidiary, The Nikko System Center Ltd., to determine its information technology needs. "Within the company and on the board, there is no one who is really a pro on these matters," says Asakawa. "They don't think there is a need."

The prolonged recession is forcing the company to make other changes. For example, plunging profits in the early 1990s forced securities firms to lead the way in breaking the lifetime-employment promise to some employees. Nikko went even further and reduced the number of support staff, commonly called office ladies, or OLs, by introducing word processors. "Where we used to have five OLs, we're now down to two," says Asakawa.

Most importantly, Nikko has decided that to compete in the future, it has to attract and encourage a new breed of employees. Already it has begun hiring people who understand advanced investment technologies and want to make the most of them. Indeed, some 20 percent of Nikko's most recent hires have been engineering students. And that, in turn, is pressuring company insiders to find ways to keep up. "The demand for change is coming from the bottom up," says Asakawa.

> "My impression is that the Japanese don't move forward with something until they really understand it. They are deliberate and careful in choosing technology."
>
> *–Allen Miner*

ALLEN MINER, DIRECTOR OF technology for Oracle Japan Ltd., one of the country's leading database vendors, sees these new demands first hand. Since Oracle first entered the Japanese market in 1983, it has been trying to get the Japanese to buy into its relational database system. After years of struggling, business is finally booming. "We have had tremendous growth in the last year and a half," says Miner. In fact, in terms of Oracle's worldwide sales, Japan has moved to third place, up from 15th in 1990.

Miner is optimistic that the boom in Japanese sales will continue. The company expected 30,000 participants for a recent Oracle user conference in Yokohama; the staff was overwhelmed when actual attendance topped 70,000. And although many Japanese firms that started experimenting with relational database systems in the late 1980s had to put their investment plans on hold during the recession, many others have recently jumped into the trial phase.

Miner, who has lived and worked in Japan for many years, thinks this study period is important for the Japanese. "My impression is that the Japanese don't move forward with something until they really understand it. They are deliberate and careful in choosing technology. But once they make their decision, they move aggressively."

Junkyo Fujieda, managing director of CSK Corp., Japan's largest information-services company, says there are some benefits to this approach: It doesn't force one person to make decisions or be responsible for a failed strategy. "Everyone shares the same *hanko*," says Fujieda, referring to the Japanese way of validating documents with a seal.

To Fujieda, the most practical role for a CIO in Japan would be heading a committee that listens to employees' requirements, builds a consensus on an IT strategy and then takes that recommendation to the board. Moreover, he says, the CIO should make sure that end users pay for the costs out of their own budgets rather than draw on funds from the company's overall budget. But Fujieda knows that establishing such a system is easier said than done.

Fujieda's own company is illustrative of many of the changes taking place among Japanese corporations. A serious decline in CSK's sales of information services for mainframes has spurred the company to review its own internal operations and strategies. Although Fujieda maintains that mainframes are not going to die out completely, he, too, is jumping on the bandwagon of PC-based network systems.

And what better place to start bridging the gap between white-collar workers and the new technologies than with CSK's own employees? To that end, CSK's president and founder, Isao Ohkawa, recently announced a plan to give each of the company's 6,000 employees a new multimedia PC to take home. Fujieda defends the idea, even though employees are still sharing PCs in the office. "If they use it at home, their kids will want to use it too," he says. "Then it will just become part of life."

Kathryn Graven is a freelance writer based in Boston.

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The Gildered Age

Political theorist and technology visionary George Gilder holds forth on the prospect of burgeoning bandwidth, the curse of meddling governments, and the care and feeding of an information economy

PERHAPS IT'S POSSIBLE TO MAKE TOO MUCH of the fact that cyberspace seer George Gilder still lives in the New England farmhouse of his youth, in the small Western Massachusetts town of Tyringham (pop. 150). The antique-red house sits below the trees on a picturesque hillside overlooking a farming valley in the Berkshire foothills. Gilder has made some modifications to the house since marrying and starting a family in it. There is a three-story octagonal addition, topped by a small cupola in which, says his wife, Cornelia, "George used to write longhand. But since he's gotten computers, it's kind of become an afterthought." (The computers are in the cooler, IT-friendly ground level, girded by a granite foundation.)

The juxtaposition of rural, conservative, Shaker-inspired simplicity with a visionary zeal for what he calls the telesphere suits Gilder nicely. In his 54 years, he has made a journey that, at least superficially, spans centuries. As a Reagan-era economic thinker, he espoused the updated supply-side doctrines originally offered as a nearly theological bastion by the likes of industrialist Andrew Carnegie: that government ought to stay the heck out of the way of unfettered capital formation, the "trickle-down" benefits of which would accrue to everyone—from the Main Line to the bread line.

Gilder now champions the unfettered entrepreneur-led development of a vibrant information economy. The ham-fisted interventions of government and economists still rankle. He faults regulatory initiatives for being outmoded and irrelevant, and the metrics and preoccupations of modern economists for inducing in the economy an iatrogenic illness—in other words, one that is caused by the treatments themselves.

Where Carnegie's vision was built on steel, Gilder's grows within rampantly capable silicon chips and "dark fiber" networks: dumb fiber-optic pipes—stripped of encumbering con-

BY LEW McCREARY AND THOMAS KIELY

PHOTOGRAPHY BY MARK ALCAREZ

trol devices—whose abundant, and hence cheap, bandwidth will bear the wealth of the nation's creative, productive future. Networks, Gilder believes, should emulate the enduring model of Bob Metcalfe's Ethernet by resembling air and, so, remaining free and capacious. "If you put too much intelligence in [a network]," he says, "it will tend to obstruct communications." Whatever intelligence is needed for network governance should live at the nodes, out of the way of the flow of traffic (a vision of low-impact regulatory conduct, if ever there was one). Networks will be infinitely open, like the vast, empty sky.

Buttressing this vision are the "law of the microcosm": that each number n transistors added to a silicon chip yield n^2 performance and value; and the "law of the telecosm" (a.k.a. Metcalfe's law): that each number n computers added to a network likewise yield n^2 performance and value. Together, these laws constitute the inexorable physics of the fully connected future: infinite computing capability plus inexhaustible bandwidth equaling, in Gilder's words, "computers *uber alles*."

Gilder, a regular contributor to *Forbes ASAP*, is a fellow of the Discovery Institute, a Seattle-based think tank. He is also the author of *Microcosm* (Simon & Schuster, 1989), *Life After Television* (W.W. Norton, 1992), the forthcoming *Telecosm* (Simon & Schuster) and several other books. He spoke last summer with *CIO* Executive Editor Lew McCreary and former Senior Editor Thomas Kiely.

CIO: *It sounds as though the ultimate drift of your theories may be that, for the CIO, the term "network management" will become an anachronism.*

GILDER: Yes, but no. It takes smart men to create dumb networks.... It's the architecture that's dumb, not the people who have to manage the transitions, maintain the connections and integrate the software. I don't think network management will be obsolete. It will change, but it will move to different points on the network. There will still be plenty for [CIOs] to do.

CIO: *With computing being dispersed to the fringes of the enterprise, and power flowing outward with that dispersion, and bandwidth getting larger and dumber, is there a role for centralized management? Is there a way to call the shots on standards, on protocols, on data quality? Or on the question of who will talk to whom and under what circumstances?*

GILDER: I don't think the world gets neat and clean all of a sudden and that all hierarchies disappear and everything becomes client/server networks. But this will make possible all kinds of diverse organizations.

The industrial era imposed a kind of hierarchical structure. The narrow-band information links required a hierarchical structure. You couldn't really supervise more than four people. And that's what most hierarchies entail: sets of four. (This was dictated by the difficulty of copying paper—you could only make four carbons.)...

But now all options are open. You can have whatever form of organization is most appropriate to the particular purpose of the group you lead.... At different times, and on different networks, these kinds of [technology management] functions—which will be necessary to perform in one way or another—will move to different places. The [role is] going to be just as demanding; there will still have to be experts. But they won't be in a glass chamber....

If you think about it, the CIO is going to be the *CEO*. That's what an organization is, really: organizing information. And since we're entering an information age, an information economy, the role of the CIO has to grow rather than diminish. The nature of business will be defined by what sort of information policies are adopted. So, this is an absolutely crucial role. It's defining the purpose and function of the business itself. In a sense, the medium does define the message in a business structure....

CIO: *In the same way that four carbons can define a reporting structure?*

GILDER: Yes, right.

CIO: *Can you make an analogy to governmental regulatory policy? What's the proper governance role—of a government or a business—in deciding such issues?*

GILDER: Government is 35 to 40 percent of the economy. It's 50 percent of R&D monies. It's a huge customer for every business. The government necessarily has to develop an array of policies that directly impinge on information technology—and can't avoid it.

What some of us have opposed is the sort of detailed industrial policy where the government comes in and decides that active-matrix flat-panel displays are key technologies of the next era, and "We like Texas Instruments and Planar Technologies," and so on. That kind of industrial policy almost always fails. It causes all sorts of disorders that are unexpected. [The government] chose GCA in photolithography and really threw the whole semiconductor photolithography business into an uproar—completely changed a number of outcomes—because of their strong endorsement of GCA. GCA, despite some $60 million being invested in it by Sematech, ended up going bankrupt, anyway.... A number of other more promising technologies were retarded as a result of this government decision to retrieve a failing firm that the old guard in the industry regarded with great nostalgia....

Political decisions almost necessarily support the past in the name of progress. Because the past is what's mobilized politically. The threatened establishment always is most efficient in the production of lobbyists. So, that's what happens when the government tries to intervene. The government is always the dog's best friend!

CIO: *I guess I was trying to push an analogy.*

GILDER: It is a good analogy that you're pushing. The government has to set policies and defend structures and enforce laws. But it should not enter the fray and become a direct participant in picking winners and losers.

CIO: *"We're going to pick OS/2! Oops...."*

GILDER: "And AIX! Oops!"

CIO: *While we're on the topic of the government and industrial policy, what about the competitive stance of communications companies in the United States, where it's relatively entrepreneurial, versus Europe and Japan, where there's a lot of government subsidy?*

GILDER: I don't see any pattern where countries that have aggressive industrial policies in some area prevail in it. I see the opposite pattern: In general, industrial policies have been destructive. The Europeans have had the most dogged and persistent industrial policies in information technology.... And they've ended up, after 25 years, with not a single major semiconductor or computer company.

However, having a smart government that doesn't overregulate or pervert your most creative private companies is very desirable. The big danger today is that we've got First World computers and communications, and we've got what the great investor Mario Gibelli calls "Third World regulations." Technologies are moving so fast that a regulatory structure that was acceptable five years ago suddenly becomes a monstrous obstacle to progress.

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> "If you think about it, the CIO is going to be the *CEO*. *That's what an organization is, really: organizing information. And since we're entering an information age, an information economy, the role of the CIO has to grow rather than diminish."*

CIO: *What would constitute First World regulation?*

GILDER: Well, regulation that recognizes the difference between static competition and dynamic competition. Technological competition is dynamic—it entails risk, entails heavy investment, brings winners and losers. Somebody wins. It establishes transitory positions of monopoly because that's what an innovation is: a transitory position of monopoly. The government today is treating telecom as if it involved static competition: the same services, essentially, or predictable new services that you can identify and regulate.

It's a regulatory scheme of competition... in which nobody can win or make any money. A Third World regulatory scheme doesn't accommodate a First World leading-edge computer industry, which is doubling its cost-effectiveness every year now....

CIO: *So, when you speak of transitory monopolies, you're suggesting, for example, that the government shouldn't have gone after Microsoft at all?*

GILDER: No. There are probably areas in which Microsoft has misstepped.... But, in general, the whole history of the industry is the integration of functions onto the CPU or the operating system. That's how this industry has been advancing. The law of the microcosm dictates that more and more functions will be integrated onto the CPU. So, if you're in the business of making floating-point processors or graphics processors, you're [eventually] going to find that function incorporated in the CPU. And unless your graphics processor is 10 times better than the one that, say, Intel integrates on its X86, you'll have to go into some other business.... That is not an act of monopolistic aggression; it's inevitable....

Similarly, the advantage of having your utilities outside the operating system—even your text editor outside the operating system—may not be worth the problems of having a separate word-processing program. There's no divine right to be in the word-processing business, as Wang discovered in the earlier years and WordPerfect may discover now—unless it figures out how to add value.

When you talk to some of these software people, they're so plaintive about it, as if there's some right to make these specialized software packages which, unless they are decisively better, are likely to be absorbed by Microsoft.

So, it seems to me that what Microsoft represents is a perfectly healthy advance of technology integrating more and more functions and thus relieving the purchaser of otiose decisions and transactions costs. And that will continue to happen. But, meanwhile, all sorts of new forms of software are cropping up.

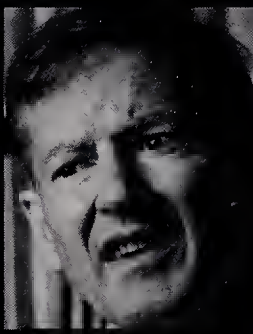
CIO: *There's been much discussion on the convergence of the cable industries and the computer industries, communication industries and multimedia, the information superhighway and all that. What's your take on where all this is headed?*

GILDER: My take on it is there's no convergence. I think it's just the computer industry taking over. The computer people who don't understand this are going to be disappointed. All these computer people chasing Hollywood producers and telephone companies are missing the great opportunity of the century, which is to just absorb and transform all these industries—make them new functions of computers. These other industries will thrive to the extent that they understand their appropriate role of providing peripherals for the computer industry, or network types or some other kind of equipment that adapts to this new world of computers *uber alles*....

CIO: *Is that what John Sculley means when he talks about the several-trillion-dollar multimedia market?*

GILDER: I think so.... My sense of it is that the computer's just gonna blow away the TV in the next few years, and forget about it. I'm even skeptical of this set-top-box business. [Intel Corp. CEO] Andy Grove put it rather well when he said that by the time they get the set-top box at the right consumer price point and form factor, the PC will be managing the television as a minor peripheral.... But, to quote Grove again, infinite processing power only gets you so far with limited bandwidth. And that's really the problem of the computer industry today. They still live in a world of bandwidth scarcity. A big change that I've been predicting everywhere, and that I think is happening, is the world of bandwidth abundance.

> "All these computer people chasing Hollywood producers *and telephone companies are missing the great opportunity of the century, which is to just absorb and transform all these industries—make them new functions of computers.*"



When computers really can pass around video files as easily as they currently pass around text files—and that can happen in the next four or five years—suddenly the television set becomes a pretty trivial kind of appliance.... When you have these big ATM networks everywhere, voice becomes a trivial matter; the computer can do all kinds of voice services that dwarf what any centrex office can give you.

So, the computer...can also pretty much absorb the telephone industry. There are hundreds of companies that have emerged in the last few years (a whole industry of conferences and magazines are covering them) that are essentially in the business of absorbing telephones: doing all kinds of predictive dialing and voice mail and voice processing and speech recognition and translation of voice to text and text to voice. A huge number of new digital telephony services are emerging. The reason they aren't really fully prosperous today is because ISDN just didn't happen, or because its price has been unacceptable. So, there's been a snag—which has allowed the phone companies to imagine they still can supply all these services....

Essentially, I see a lot of other people being forced to enter the computer business, which means competition. But as Michael Rothschild writes in *Bionomics*, "the hallmark of competition isn't open conflict, it's diversity." What we find is a huge diversification of the computer business.

CIO: *Once we've achieved this condition of infinite computing power and bandwidth abundance, what's going to be the chief entrepreneurial opportunity?*

GILDER: I think the huge entrepreneurial opportunity will be defining the goods and services of an information economy. There'll be tremendous competition in the Ethersphere. And that will mean more and more of the business of the country will flow through this information infrastructure....

CIO: *And it won't just be a matter of filling all the bandwidth; it will be a matter also of navigating it.*

GILDER: Yes. Navigating the bandwidth, connecting to the bandwidth, maintaining the bandwidth. And, of course, filling it with products that people want. See, what essentially happens is a lot of the middle structure of the economy is removed. The whole catalog industry is a sign of what can happen. [Catalogs] are feeding the customer directly.... Goods and services will increasingly move to the network. And that's trillions of dollars of business flowing over the network.

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When I talk to phone companies, they always say to me, “Well, if bandwidth is going to be nearly free, how can we make money?”

But, of course, what happened in the computer industry is that the transistor became nearly free; it’s 400 millionths of a cent now, or less.... And as a result, the computer industry is the dominant world industry. It certainly dominates the U.S. economy—some 48 percent of all the incremental GNP over the last three or four years has come from computer-related industries. About half of all our exports, high-technology exports and high-technology capital goods in particular. It really is already the dominant force in the economy. And its force is obscured by the plummeting prices.... Economists don’t know how to measure the productivity of industries with plummeting prices. If they measured the computer industry the way they measure the automobile industry,...beginning in 1965 or so, the computer industry itself would be measured to be thousands of times bigger than the entire economy!

Now, I know that kind of index is not really right; but...it reveals that the way economists measure value-added systems is very deceptive and fallacious.

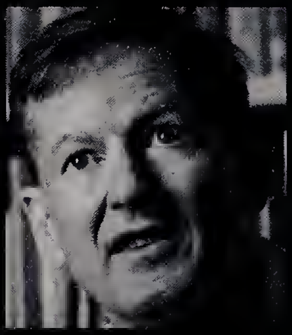
CIO: *Third World metrics.*

GILDER: Third World metrics! Yes! It’s precisely Third World metrics. It’s the kind of metrics that allowed them to look at a Third World economy like the Soviet Union and assume for 25 years that because their output of steel ingots was going up at a predictable rate, their economy was growing as fast as our economy. Economic advance is really in differentiation and refinement rather than in quantitative output. And they don’t really know how to measure the productivity of products that are differentiating at a tremendous pace. Yet that’s the essence of our development....

There’s a real crisis in economics, and this administration just doesn’t know of it.... They go over to Japan and think that the big heroic job they can do for the U.S. is to close the trade gap with Japan. It would be a catastrophe if they closed the trade gap with Japan! The trade gap...consists of largely a lot of wonderful memory chips that are indispensable for our world-leading computer industry, which gains two-thirds of the world’s profits in computers for U.S. companies. These profits are contingent on importing Japanese liquid crystal displays and DRAMs, and also capital goods and various other absolutely crucial pieces of equipment....

Meanwhile, we’ve sold them all sorts of ideas and services and just a tremendous flow of value back to Japan in ways that are not measured in the Third World metrics they use. It’s a very healthy, good relationship—couldn’t be better. But, because the administration looks at it from this obsolete perspective of nationalist economics, they think it’s sick. And they are determined to inflict real iatrogenic illness on both the U.S. and Japan as a result....

“Economists don’t know how to measure *the productivity of industries with plummeting prices. If they measured the computer industry the way they measure the automobile industry, the computer industry itself would be thousands of times bigger than the entire economy!”*



All these countries with nice trade balances have done it just by being totally unappetizing to invest in...so they can’t possibly run a trade gap. The trade gap is an entirely healthy phenomenon.

That’s just another example of the obsolescence of the current modes of analysis applied to an information economy. CIO

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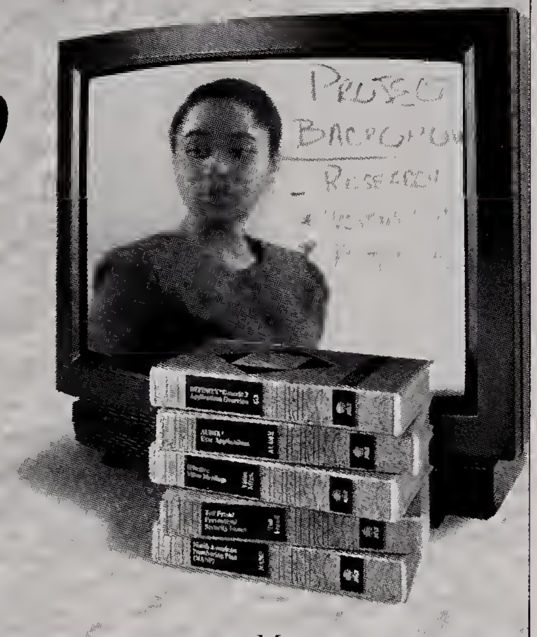

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DYNAMIC DUOS

CIO/CEO partnerships prove that two heads are often better than one. SIM's eighth annual Partners in Leadership Awards recognize senior business and IS executive collaborations that have yielded exceptional results.

BY P.W. ROLLINS

Leadership used to be something you practiced alone. The Alexanders, the Caesars and the Napoleons of this world assumed all the burdens—and the glory—reserved for solitary makers of great decisions. But this is the era of Bill and Hillary, Merchant and Ivory, Ben and Jerry. Partnerships—formed not to shore up weaknesses but to capitalize on strengths—underlie some of today's most notable achievements. And in the corporate world, where IT is increasingly valued for its strategic merits, the partnership between CEO and CIO has provided some of the greatest benefits.

Since 1987, the Chicago-based Society for Information Management (SIM) has bestowed its Partners in Leadership Award on CEOs and CIOs who have demonstrated outstanding leadership and teamwork in creating value for their organizations. The winners are recognized for such achievements as improving the quality and speed of customer service, shortening cycle times, reducing costs, improving business processes and differentiating products and services. SIM's selection committee members conduct one-day visits to all nominees' sites, where they speak with senior managers, line and staff executives, users and external customers. Their goal is to evaluate the quality of the executive partnerships and their impact on the business.

This year's winners are Graduate Health System (GHS) and Lockheed Corp. In each case, the CEO and CIO have labored mightily together to implement technology strategies that improved both financial and business performance. Their experiences demonstrate the power of alliances and—even more important—the necessity of a shared vision.

If there's one area where change is both critical and unstoppable, it's health care. Without vision and the ability to realize it successfully, health-care providers stand to be left behind as the industry is transformed. That's why the partnership between Harold Cramer and Philip A. Katz has been so crucial to the success of Philadelphia's Graduate Health System: Between the two of them, they have managed to keep the organization at the forefront of its industry.

GHS, with more than 7,000 employees in Pennsylvania and New Jersey, operates seven not-for-profit hospitals, an 85,000-member HMO, an insurance company, a clinical-engineering company, a billing company and a consortium of physicians. "We're constantly analyzing, developing and implementing the tools to try to optimize the viability of the health system, not [for] today but [for] tomorrow," says Katz, the company's vice pres-

KATZ *(left) and* **CRAMER:** *Using technology as a business tool at Graduate Health System.*

PHOTO BY EUGENE MOPSIK

ident for planning and technology.

Central to that effort is communication. "A two-way street" is how Cramer, GHS's chairman and CEO, describes his relationship with Katz. Doors are always open, and the two keep up a "full-time exchange" of information, he says.

Katz agrees. "I probably see Harold three or four times a day," he says. "He has the interest and the ability to look at things on a detailed level. He's interested when our system response time is slow; he's interested to know...when we are installing significant new applications or bringing new institutions live. He likes to know what's going on."

Katz's position "was created as we talked about it," he recalls. Far from being limited to information systems and communications, his responsibilities also include strategic planning, market research, marketing and public relations, sales and product-line development, program development and even physician recruitment.

"Harold Cramer and I see the world in the same way," Katz says. "We place a lot of emphasis on strategic planning, the understanding of our marketplace, the development of the systems and product lines to service that marketplace, and, simultaneously, the development and coordi-

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nation of the most powerful tools to accomplish those goals and objectives." In this world view, technology is strictly a tool to support the business, and initiatives can come from Cramer, Katz or end users.

Katz's first challenge when he joined the organization in 1990 was a project that Cramer had initiated back in 1986. Wanting to create an online system that would replace patient bedside charts in GHS hospitals, the CEO had negotiated a contract with Health Data Sciences (HDS), of San Bernardino, Calif., for development and assembled interdisciplinary teams to participate in the design. But things were proceeding slowly. "I was completely unhappy with the implementation," Cramer recalls. So when Katz came on board, he made the project a top priority.

Mind-set had been a large part of the problem. "Information systems were regarded as ends in themselves," Katz explains. His solution was nothing less ambitious than a change in culture. "We worked very hard with our IS people to get them to realize that what they were charged with was the stewardship of the tools needed to accomplish the business of the organization."

End users received similar education and were recruited into a system of "shared ownership" to foster commitment. Once the technology was presented as a business tool, Katz says, most users bought in. User-led steering committees were formed in each of GHS's operating divisions and were charged with allocating resources and deciding on the technology support and time frames appropriate for their institutions. Physicians were brought into the strategic-planning process, and all applications installations had to be led by an end user. IS personnel, meanwhile, assumed a supporting role.

"Katz really started motivating people to get the system up and running," Cramer says. As a result, the first hospital came online before the end of that year. Since then, another four have been included, and the remaining two should be up next year. In all, 1,850 terminals have been installed to date, including more than 150 in physicians' practices, with a central data center located on the campus of one of the hospitals in Philadelphia.

The result has been immediate online access to current and historical patient data as well as improved patient care. Because an electronic backbone network was also developed to link the many portions of GHS, data is available at any of the hospitals. Now if patients are transferred, their information doesn't have to move with them—it can simply be pulled up online.

> **"We worked very hard to get our IS people to realize that they were charged with the stewardship of the tools needed to accomplish the business of the organization."**
>
> **–PHILIP A. KATZ**

Cramer and Katz also collaborated on the development and implementation of an automated materials-management system in 1992 to centralize purchasing and allow just-in-time inventory replenishment. The next year, they worked together on a videoconferencing system to enable ongoing education and remote meetings and consultations over the network.

Both Cramer's and Katz's dedication and enthusiasm have been critical to the success of these systems. And the benefits have been significant: The materials-management system, for example, helped save the organization $1.4 million in its first year. But Cramer is quick to point out that financial results are not his top concern. "I don't look, like a lot of people, at paybacks," he says. "What I look at is more-efficient operation. It helps the physicians practice better medicine."

Dean O. Allen's statement that something "wasn't rocket science" doesn't apply to all decisions made at Lockheed Corp. After all, the Calabasa, Calif.-based company manages shuttle launches at Cape Kennedy and is the prime contractor on the Hubble Space Telescope, among other things. It's a culture where tough technology challenges are the norm, and that includes information technology.

Allen is the corporate vice president of information and administrative services, so it is his job to meet those challenges. In May 1991, Lockheed's Chairman and CEO Daniel M. Tellep told Allen to find a way to cut 15 percent from the company's IS budget while improving IS performance. Tellep really *is* a rocket scientist and "a believer in technology," Allen says. As such, the CEO wasn't trying simply to cut costs at the IS department's expense; rather, "he wanted to create something bigger and better than we already had," according to Allen.

Allen responded by forming a group of IS managers from the company's four business units and 17 IS service departments to study the problem and come up with some suggestions. "Historically, we ran highly autonomous, decentralized operations," says Allen. Everyone suspected, however, that the solution lay in breaking with tradition. "Tellep told us that there were no sacred cows—just do a study, in-

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volve all the IS people, and come back with the best recommendations," he recalls.

By July, senior management had approved the group's main recommendations. "The financial savings were so compelling and the study so well done, that it just flat couldn't be ignored," says Allen. Lockheed decided to consolidate its 17 data centers, centralize IS purchasing and build a new software-engineering model. In some ways, it was a shocking decision; Lockheed was taking a big step away from its decentralized corporate culture. Consolidating the data centers was an obvious move, Allen says, "but it sure was politically charged."

Partnerships—formed not to shore up weaknesses but to capitalize on strengths—underlie some of today's most notable achievements.

Predictably, politics bowed before financial pressures. Lockheed's IT budget approached $600 million in 1991, and Tellep was demanding $90 million in cost savings. But reducing costs wasn't the only goal, and that's one reason the partnership between Tellep and Allen proved so important. "Hell, the general managers can reduce costs," says Allen. "But Tellep wanted to [do more]." Recognizing that technology "is Lockheed's lifeblood," the CEO was hoping to achieve not just significant economies but also efficiencies that would help strengthen Lockheed's IT capabilities.

By April 1992, just 11 months after Tellep's original challenge, a new subsidiary—the Lockheed Information Technology Co.—was legally incorporated and its headquarters established in Denver. Between December 1992 and January 1993, Lockheed Missile and Space Co. in Sunnyvale, Calif., shifted its data center to Denver on time, on budget and without any major disruptions in service. With two Cray supercomputers in place, the data centers from Lockheed companies based in Georgia, New Hampshire, California, Texas and South Carolina made the same move in 1993, also on time and on budget.

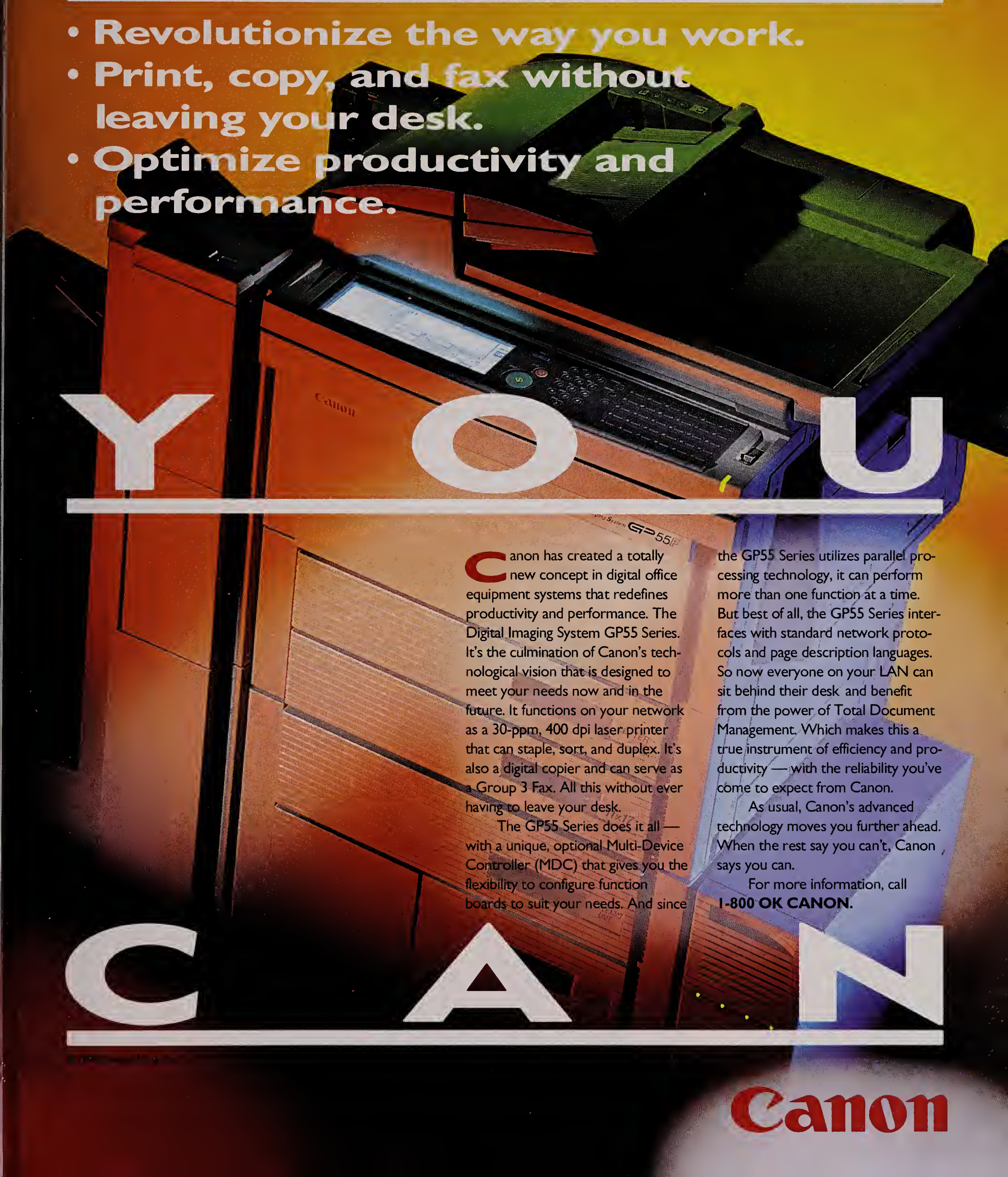
As a result of the centralization, operational expenses between 1991 and 1994 have been reduced by $59 million, and the company projects $101 million more in savings over the next two years. Ironically, those savings are underwriting new IT investments; Lockheed's capital budget for IT doubled between 1992 and 1993.

Now that the trauma of giving up decentralized data centers is behind them, Lockheed's line IS organizations are focusing on client/server technology. "We're trying to make sure we do it right, so we never have to go through another consolidation," says Allen.

While the SIM award honors the partnership between Allen and his CEO, the IS executive hastens to point out that Lockheed's success resulted from a collaboration among many people. "The credit goes to the entire IS team," says Allen. "We had never done something on this scale before." Even so, for a company that helps people fly to the moon, thinking big is just part of the job. CIO

TELLEP *(left) and* **ALLEN:** *Centralization cut costs and strengthened IT at Lockheed.*

PHOTO BY MICHELLE SMITH



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A Switch in Time

On the surface, ATM sounds like a big-bandwidth panacea, moving massive amounts of video, voice and data across our enterprises and into our homes. But while the technology is poised to take off, high costs, inadequate standards and lack of a track record are keeping it momentarily tethered.

BY JOHN EDWARDS

ILLUSTRATION BY VALA KONDO

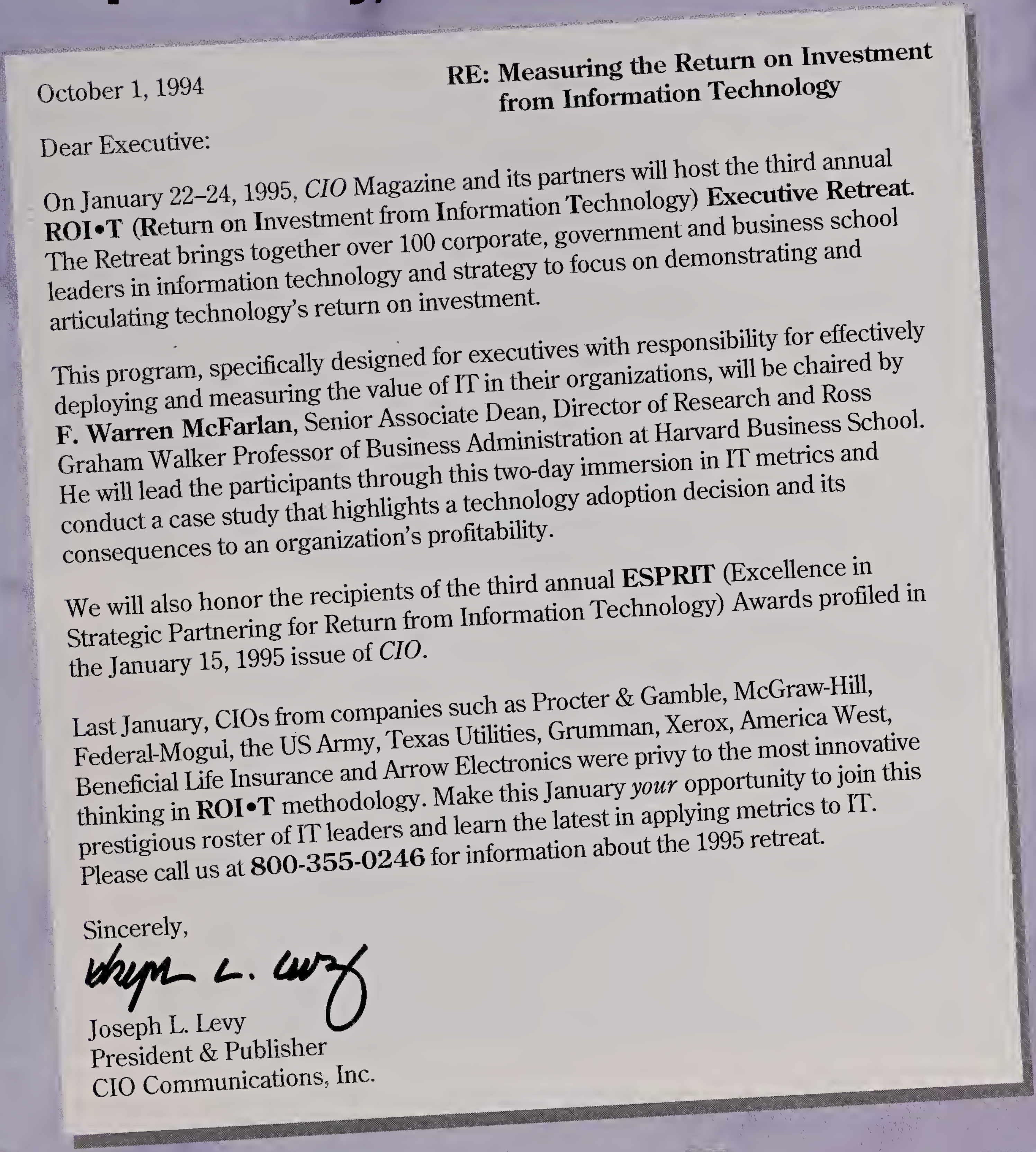
These days, people talk about the "information superhighway" in the same glowing terms that were once reserved for discussions of the hereafter. To listen to the infobahn's most fervent proponents, one might imagine a near-term future in which high-speed multimedia networks effortlessly and cost-effectively link businesses, governments, hospitals and schools around the world. But as with most utopian discourse, information superhighway talk tends to involve more wishful thinking than down-to-earth planning.

When people do begin talking about the information infrastructure's nuts and bolts, the term "asynchronous transfer mode" (ATM) is guaranteed to pop up. ATM is a set of international standards for high-speed networks. With ATM, users can send massive amounts of data, voice, graphics and video information simultaneously over a single network. The technology divides information into 53-byte cells that are stamped with an address and transmitted over the network at very high speeds, ranging from approximately 45Mbps to 1.2Gbps—and theoretically even faster. An ATM switch reads the address and connects the cell to a user or another component on the network.

In concept, ATM sounds like the perfect solution to everybody's telecommunications needs, from Fortune 500 corporations that have to quickly and efficiently move information among multiple sites to home cable-TV viewers who want to view Ren and Stimpy on demand. For businesses and other organizations, ATM will ultimately be used across the enterprise, carrying information over national and international networks, through campus and building backbones and onto the desktop. It will send existing network technologies packing to the landfill or museum.

Indeed, ATM is on the verge of becoming a serious industry force, according to Paul Callahan, a senior analyst at Forrester Research Inc., a market-research company in Cambridge, Mass. "We think that market activity will pick up in 1995 and really heat up in 1996," he says.

Callahan says ATM activity has been held back by several factors, including a reluctance among potential users to adopt a technology that has yet to prove its real-world value. ATM believers are placing their faith in the technology's four main strengths: combined voice, data and video capabilities on a single network; increased bandwidth; faster network operation; and reduced network complexity. But Callahan points out that the near-term demand for



If You Are the CIO of a Fortune 1000 Organization or Hold Equivalent Public Sector Responsibility, Please Read This Letter.

October 1, 1994

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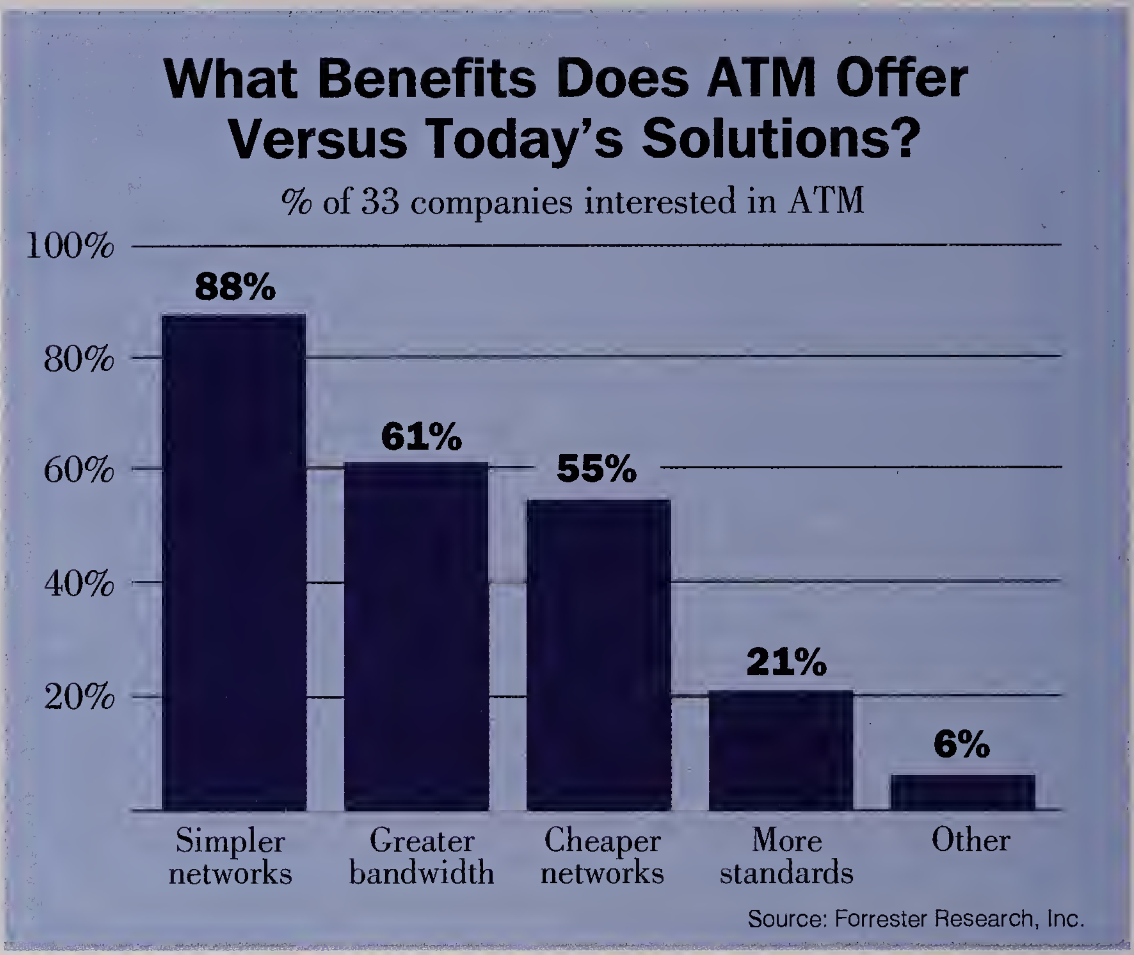
ATM will be for data only, leaving ATM's higher speed and reduced complexity to convince users to buy it. "At this stage, most parties are taking a wait-and-see attitude."

ATM technology will gradually work its way into corporate communications infrastructures over the next several years, says Jonathan Reeves, executive director of the ATM business unit at General DataComm Inc., a telecommunications hardware vendor in Middlebury, Conn. "The nice thing about ATM is that users can implement it step by step, running it alongside their existing technologies," he notes. "You don't have to start from scratch."

Reeves, like other ATM industry observers, expects the technology to make its initial impact in campus-backbone environments, where it's flexible bandwidth will carry an enterprise's growing local area network traffic with ease. "It's the area where there's the most compelling need for ATM," says Reeves. "It's where we'll see the first activity."

He also doesn't expect to see ATM widely adopted on the desktop for several years. "It will happen," he says, "but not overnight." Forrester's Callahan agrees, pointing out that most business users aren't starved for the extra bandwidth ATM provides, with video, imaging and other bandwidth-hungry media yet to make serious inroads at the desktop level in most organizations.

A key obstacle to ATM's growth at all levels, but particularly at the desktop, is a lack of adequate standards. That may soon change, however: A 530-member industry consortium, the ATM Forum, is attempting to structure and standardize ATM technology, which has developed haphazardly over the past several years. The Mountain View, Calif.-based organization is concentrating on two areas: standards that will allow users to take advantage of ATM and a method for controlling the congestion that results from many users attempting to access the same information simultaneously. (ATM has no built-in flow-control mechanisms, so the capability must be built on top of the technology.)



What Benefits Does ATM Offer Versus Today's Solutions?

% of 33 companies interested in ATM

Source: Forrester Research, Inc.

The ATM Forum's LAN emulation standards will allow PCs on Ethernet or Token Ring networks to link to ATM-attached servers through ATM switches, routers and other products. With ATM, network users will be able to take advantage of virtual LAN technology, including protection from heavy LAN traffic, the ability to move without manual administration and the power to work within independent user groups.

High prices have also worked against ATM. As with several other promising network technologies, such as fiber distributed data interface (FDDI), stratospheric costs have scared away many potential users. In a recent Forrester study of Fortune 1000 companies interested in the technology, 58 percent of respondents indicated that lower costs would accelerate their ATM plans. High-speed wide area and phone network switches currently cost as much as $1 million. ATM switches for smaller networks are priced at about $1,200 per port—expensive by conventional network standards.

But ATM may eventually become cost-effective as well as technologically attractive. ATM switch prices have dropped by approximately 50 percent each year since 1991 and are projected to keep plummeting as manufacturers churn out ATM products in ever-greater numbers. Forrester expects that the price of PC-based ATM adapters will fall to about $495 by 1996. And desktop ATM will gain full momentum just after the turn of the century, when ATM PC adapter prices could drop below $200 each, prompting large companies to stop buying Ethernet and Token Ring products.

ATM may also get a shot in the arm from the progress being made in complementary technologies. Video at the desktop, for example, is one major driver of ATM, and Forrester expects PC-based video-compression boards will sell for under $300 by 1996 and may even be bundled with high-end PCs just as CD-ROM drives are now.

Also boosting ATM's chances for an eventual breakthrough are plans by vendors to offer new software technologies and strategies that ATM would help exploit. Microsoft Corp., for example, is planning to build basic videoconferencing and video E-mail

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support directly into Windows, which will likely spur end-user demand for these services on the desktop.

One organization that's not daunted by the high cost is Sandia National Laboratories, an Albuquerque, N.M., research facility operated by Martin Marietta for the U.S. government's Department of Energy. Sandia is conducting a series of test projects that bring desktop ATM support to internal customers. The technology will be used to facilitate a wide range of design and research work, for example, by providing future access to the company's Intel Corp. Paragon massively parallel computer, the world's fastest to date.

"We feel that ATM will be the next-generation networking technology," says Nicholas Testi, a senior member of Sandia's technical staff. "We initially went into the research to look at ATM from an analytical standpoint, but the customer trials are designed to exercise ATM in a real-world manner."

Sandia recently consolidated its supercomputing resources at its headquarters and now provides a sister site in Livermore, Calif., with supercomputing, file-storage and visualization services via links that use ATM technology. Sandia's supercomputer resources are divided into two environments: a secure system for classified operations and a restricted system for unclassified work.

Both systems provide remote FDDI or Ethernet LANs with TCP/IP access to centralized network resources. The network uses a pair of 44.7Mbps links that are leased from AT&T and regional phone companies Pacific Bell and US West. The connections are slated for an eventual upgrade to synchronous optical network (SONET) services to provide performance at 155Mbps.

Testi says Sandia was initially drawn to ATM by its efficiency and high speed, but he notes that the technology also works hand in glove with the type of research conducted at the labs. "We're interested in desktop video and desktop imaging and things like that. The combination of using ATM on switching platforms, the multimode capabilities and also the wide ranges of speed are very interesting to us," he says. "We're big-switch bigots."

A Partial List of ATM Vendors

- **3Com Corp.**
  Santa Clara, Calif.
- **Cascade Communications Corp.**
  Westford, Mass.
- **Cisco Systems Inc.**
  Menlo Park, Calif.
- **Fore Systems Inc.**
  Warrendale, Pa.
- **General DataComm Inc.**
  Middlebury, Conn.
- **IBM Corp.**
  Armonk, N.Y.
- **Lightstream Inc.**
  Billerica, Mass.
- **Newbridge Networks Inc.**
  Herndon, Va.
- **Stratacom Inc.**
  San Jose, Calif.
- **SynOptics Communications Inc.**
  Santa Clara, Calif.
- **Telematics International Inc.**
  Ft. Lauderdale, Fla.
- **UB Networks**
  Santa Clara, Calif.

SOURCE: INTERNATIONAL DATA CORP.

With ATM gaining an increasingly high profile, numerous telecommunications vendors are conducting experiments and trial projects, designed—in one way or another—to assess the technology's effectiveness in moving vast quantities of information. One of this year's most publicized ventures is Time Warner's trial in Orlando, Fla., which uses ATM to provide interactive services to customers' TV set-top boxes. That project and similar cable-TV and phone-company efforts use ATM to provide real-time delivery of pay-per-view movies, home shopping, computer service support and other interactive multimedia services. Although such ventures aren't targeted at business users, the ATM infrastructures being developed for these projects will eventually become available to organizations that wish to move large amounts of information among regional sites or across the nation.

While most ATM ventures are concentrating on networks that use copper and/or fiber cabling, AT&T is taking the technology into space with a trial that's designed to evaluate the challenge of transmitting broadband technologies via a mix of satellite and fiber connections.

The communications giant has joined forces with Japan's international carrier Kokusai Denshin Denwa (KDD) and Australia's international carrier Telstra Corp. for a joint intercontinental technical trial. The project will connect KDD in Tokyo, Telstra in Sydney and AT&T in Holmdel, N.J., with a link running at 45Mbps. The project started in July with an analysis of ATM's performance over satellite. It will later include testing of operation techniques, such as bandwidth on demand, service integration, congestion management, maintenance and other services. The trial is expected to continue into 1995.

"The purpose of the trial is for us to understand how to use ATM technology in the international network infrastructure," says Jim Artherholt, a Bell Laboratories technical manager. Artherholt observes that satellite ATM may be the only viable choice in the years ahead for users in countries where undersea cable capacity is insufficient to handle new broadband technologies. "There are many locations in the world where the only way to get capacity of 45Mbps or greater is with satellite," he says.

Artherholt uses the example of a hypothetical exploration company located in Brazil. "Brazil is connected very effectively on their coastal areas with cable, but in the interior the telecommunications infrastructure isn't quite as well developed," he says. "We can get to the interior by building a satellite earth station."

Geographic location will also play a significant role in when a particular organization can cost-effectively take advantage of ATM in communications outside of a local site, according to Edward Raliski, network systems manager at Wake Forest University's Bowman Gray School of Medicine in Winston-Salem, N.C. He notes that Bowman Gray plans to use ATM to send real-time medical images to physicians around the state. "We're going to be a beneficiary of North Carolina's statewide information highway, which is ATM/SONET-based," he explains. "Our connection is installed on the network now, and as the rollout goes to the first 100 or so sites, it's providing the ability to look at the technology's potential."

ATM may have problems supporting some highly touted applications, says Tatsuya Suda, a professor of computer science at the University of California in Irvine. "Too many people look at ATM as a panacea for all their bandwidth problems," says Suda, who is the vice chairman of the Institute of Electrical and Electronic Engineers' (IEEE) computer communications technical committee. He points out, for example, that while ATM can handle video on demand within a single building with no difficulty, a network that aims to provide the service to thousands of users over a wide area "would require new protocols and even a higher bandwidth than ATM can currently deliver."

> **"Too many people look at ATM as a panacea for all their bandwidth problems."**
>
> *–Tatsuya Suda*

Still, Suda and others believe that ATM will, over the long term, dominate—if not completely replace—the current hodgepodge of communications standards. Suda says that for high-speed applications—anything higher than about 160Mbps—ATM may be the only practical choice available. "What else do you have?" he asks. "You don't have anything else but ATM."

Still, current networking technologies aren't doomed to disappear anytime in the immediate future, says Forrester's Callahan. He advises potential users to move cautiously. "ATM is limited today," he says, "but it's well worth keeping an eye on." CIO

John Edwards is a freelance writer based in Mt. Laurel, N.J.

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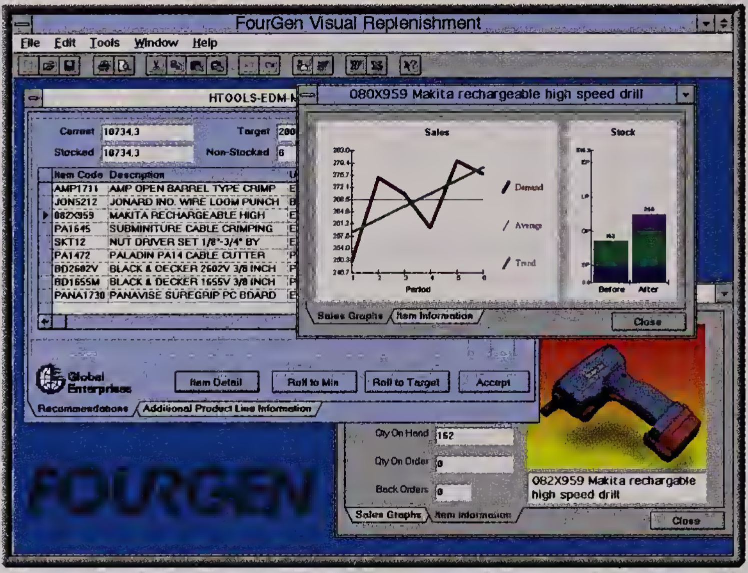

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PA1645	SUBMINITURE CABLE CRIMPING
SKT12	NUT DRIVER SET 1/8"-3/4" BY
PA1472	PALADIN PA14 CABLE CUTTER
BD2602V	BLACK & DECKER 2602V 3/8 INCH
BD1655M	BLACK & DECKER 1655V 3/8 INCH
PANA1730	PANAVISE SUREGRIP PC BOARD

Qty On Hand 152
Qty On Order 0
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082X959 Makita rechargable high speed drill

Today's businesses often struggle to make sense of all the data they gather. FourGen Software Inc.'s new line of graphical decision-support tools, FourGen Visual, performs a multitude of specific management tasks—such as sales analysis, warehouse management and budget planning—in a format that's both intuitive and graphical.

The tools enable users to utilize product data in graphical form. For example, retailers composing a product order can use Visual Replenishment software to see a picture of a particular product's usage over time; by clicking on a chart showing order quantities, they can adjust the graph of desired stock levels to enter the amount they want to purchase.

Using spreadsheets, word processors and other Windows-based tools, users can also create profit-and-loss statements and drill down to find more-detailed information. The application runs under Microsoft Windows and accesses data from the product's data warehouse or its database server.

Other Visual products in development include Visual Treasury Management and Visual Asset Manager. Packages start at $30,000. For more information, call 800 333-4436.

E-mail: Don't Leave Home Without It

E-mail addicts need no longer suffer withdrawal on the road, thanks to AirNote, a new wireless-messaging product from Notable Technologies Inc. AirNote allows mobile professionals to receive E-mail, Internet and computer-dispatched messages as well as telephone messages via a text pager.

Users can receive electronic mail from any computer that has Internet access. Those who have Windows and Lotus Development's cc:Mail, Lotus Notes Mail or Microsoft Corp.'s Mail can have their most important messages forwarded to their AirNote pagers; users of the product can also specify which messages they want to receive—for example, all messages from the boss or those containing key words—as well as which messages can wait. The company's SendNote software also lets coworkers send messages they've typed into a modem-equipped PC. An 800-line operator will take dictated messages from callers.

Minimum system requirements for AirNote are Windows 3.1 with 2MB RAM, DOS 5.0 with 640K RAM, or Macintosh System 6.0.5 with 1MB RAM or System 7.0 with 2MB RAM; a 300-baud or faster modem is required. The $349 product includes software and a text pager, network and operator-service activation, and a personal Internet address. Service plans offered through PageNet and SkyTel range from $19.95 to $124.95 per month, depending on the number of messages sent and the extent of coverage. For information, call 800 732-9900 or send a message to *sales@airnote.net*.

Productive Presentations

A speaker asks her audience a question, and an awkward silence ensues. Audience members avert their eyes and shuffle papers to avoid speaking in public. Fleetwood Furniture of Holland, Mich., is hoping to turn such uncomfortable moments into productive periods.

Fleetwood Furniture's new Reply Wireless Group Response System enables audiences of up to 1,500 to communicate in real-time with presenters via hand-held wireless keypads. Once audience participants record their responses on their keypads, that data is transmitted to an interface unit via FM radio-frequency signals. In just three seconds, participants' response data is downloaded to the main computer screen or monitor for group viewing.

Although individual responses aren't revealed to the group, presenters have access to personal data, which lets them analyze results statistically to determine, for example, how responses correlate with such demographics as age, sex and income level.

The Reply Wireless Group Response System is also designed for training and educational programs and team-building activities. The system can be used with teleconferencing or satellite applications as well. Fleetwood Furniture says that its system will maximize audience attention by introducing visual and physical stimuli, increase participants' comprehension, improve participants' recall and prevent any individual or clique from dominating the audience.

Reply Wireless software ranges in price from $500 to $5,000; hardware, including keypads, interface unit, an RS-232-C connector and a carrying case, starts at $2,165. In addition, Fleetwood has systems available for rental.

Call Fleetwood Furniture at 616 396-1142 to obtain additional information on pricing.

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INDEX

Page numbers refer to the first page of the article(s) in which the company is mentioned. This index is provided as a service to readers. The publisher does not assume any liability for errors or omissions.

Company Index

ARDIS 37
AT&T 70
Action Technologies Inc. 70
Adobe Systems Inc. 76
Amoco Corp. 26
Andersen Consulting 37
Anheuser-Busch Co. Inc. 14
Apple Computer Inc. 54
Automatic Data Processing 37
Banyan Systems Inc. 70
Borland International 14
British Airways PLC 37
CSC Consulting 70
CSK Corp. 46
Computer Associates Intl. Inc. 14
Computron Technologies Corp. 70
DST Systems 26
Decision Data Service Inc. 14
Delrina Corp. 70, 76
Digital Equipment Corp. 14
Edcor Data Services Inc. 14
Federal Express Corp. 37
FileNet Corp. 70
Forrester Research Inc. 37
Gartner Group Inc. 37
General Imaging Corp. 76
General Motors 14
General Public Utilities Corp. 26
GE 14
Graduate Health System 62
Hewlett-Packard Co. 14
IBM Corp. 14, 26, 70
Individual Inc. 37
Intel Corp. 54
International Data Corp. 14, 70
Intuit 14
Janus Capital Corp. 26
JetForm Corp. 70
KFC Corp. 70
Lockheed Corp. 62
Lotus Development Corp. 14, 70
Merrill Lynch & Co. Inc. 46
Microsoft Corp. 14, 54, 70, 76
Motorola Inc. 37
Network Imaging Systems 70
Nikko Securities Co. Ltd., The 46
Novell Inc. 14
Olsten Corp. 14
Oracle Japan Ltd. 46
Planar Technologies 54
Price Waterhouse 14
Process Design Sciences 70
Prodigy 14
RAM Mobile Data USA 37
Reach Software Corp. 70
Recognition International Inc. 70
Sematech 54
Shiseido Co. Ltd. 46
Sigma Imaging Systems Inc. 70
Sony Corp. 46
Sun Microsystems Inc. 14
SunExpress 14
TestDrive Corp. 14
Texas Instruments Inc. 54
Trinzic Corp. 14
United Parcel Service 37
ViewStar Corp. 70
Wang Laboratories Inc. 54, 70
Wilson Sporting Goods Co. 37
Wireless Computing Associates 37
WordPerfect Corp. 14, 54, 70
Workgroup Technology Corp. 70
WorkPoint Systems Inc. 70
Yankee Group, The 37

Advertiser Index

AT&T 4, 40, 61
Ameritech (Regional) 67
BMC Software 15
Booz-Allen & Hamilton 44
CIO Communications Inc. 49, 71
CNBC (Regional) 67
Cannon 69
ComNet '95 79
Computer Associates Intl. Inc. 2
Digital Equipment Corp. C2
EMC Corp. 17
Gupta Corp. 30, 53
Hewlett-Packard Co. 36
Information Builders Inc. 9
Informix Software Inc. C4
Kellogg 75
Lanier 73
Lawson Software C3
MicroAge 35
Novell Inc. 33
OpenConnect 19, 21, 23, 25
QMS Inc. 13
SAS Institute Inc. 6
Sequent 64
Stratacom Inc. 77
Sybase Inc. 10
Xerox Corp. 59

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New Value Systems

Nordstrom Valves set out to find a better way to market its products. Along the way, it also gained a tool that lets customers do their own configuration.

Nordstrom Valves Inc. doesn't cut corners when it comes to the pipeline valves it manufactures and sells to the oil and natural-gas industries. "In terms of both features and price," declares Benny Boss, vice president of sales for the Sulphur Springs, Texas-based company, "we are the Cadillac of our industry."

Unlike a De Ville, however, the selling points of an industrial valve cannot be demonstrated during a test drive. So, to illustrate the value of its products, Nordstrom implemented an interactive software program in 1991. The technology has proved useful not only to salespeople but also to customers, who now have better information with which to select a valve.

Nordstrom's sales force typically works with customers' engineers during the design phase of a project. "One of the keys to our success is getting them to specify our valves upfront," Boss says. However, with sales cycles as long as one year and prices that can be 15 to 25 percent higher than those of competing valves, Nordstrom realized that it needed to find a better way to market its products. Specifically, it wanted to respond to the initial qualms customers often expressed about its prices by easily demonstrating how the quality built into its valves could actually save money throughout their useful lives.

Nordstrom hired The SoftAd Group Inc., a developer in Mill Valley, Calif., to create a sales and marketing program that salespeople could use on their notebook PCs to demonstrate products' features and benefits. "The program compares the prices of our valves against our competitors' [prices] by factoring in maintenance costs along the way," Boss says.

Salespeople now use the program to quickly demonstrate life-cycle cost analyses of Nordstrom's products, as well as ROI and break-even analyses. For example, the program shows the costs of repair and materials as well as those associated with not producing oil and gas when a pipeline goes down for a specified amount of time. Without the program, conducting such an analysis required Nordstrom's salespeople to create a mathematical model and crunch the numbers with calculators. Says Boss, that would "take so much time that the customer would lose interest."

Earlier this year, Nordstrom implemented an additional program aimed at the configuration stage of its selling process. Previously, the customer would specify such requirements as the pressure and flow that a valve would have to withstand, and the salesperson would determine which valve is best by making numerous complex engineering calculations using manuals and a calculator.

The new, interactive program—also developed by The SoftAd Group—draws on a database instead of technical manuals and allows salespeople to perform in a matter of seconds gas- and liquid-flow, torque and other calculations that previously could take hours to perform manually. It also performs conversions and searches data on more than 500 valves. Since product data is online, it can be updated easily without the need to reprint manuals. And results are presented in a graphical, easy-to-understand format.

Because of the cyclical nature of the industry, Boss can't correlate use of the programs to an increase in sales, but he does believe that salespeople are more productive because they no longer have to do so much number crunching themselves. And customers now have access to detailed information that lets them make better decisions.

The original marketing program has been translated into Spanish for use throughout Nordstrom's sizable Latin American market. Best of all, both it and the technical program can be left behind at customer sites, where they will continue spreading Nordstrom's message and allow customers to configure products themselves. "Once we demonstrate the program, we encourage customers to load it onto their hard drives," Boss says. "It's a marketing tool that helps us and lets our customers make comparisons by themselves."

–Megan Santosus

VITAL STATISTICS

Organization: *Nordstrom Valves Inc., Sulphur Springs, Texas*

Application: *Graphical sales and marketing tools*

Technologies: *DOS programs developed by The SoftAd Group Inc. that run on Toshiba notebook PCs*

Scope: *The 15-member worldwide direct sales force*

Sponsor: *Benny Boss, vice president of sales*

Objective: *To overcome customers' misgivings about the price of products*

Payoff: *Improved productivity of salespeople; ability of customers to make decisions based on more-detailed information*

Value Added: *Customers can configure valves themselves*

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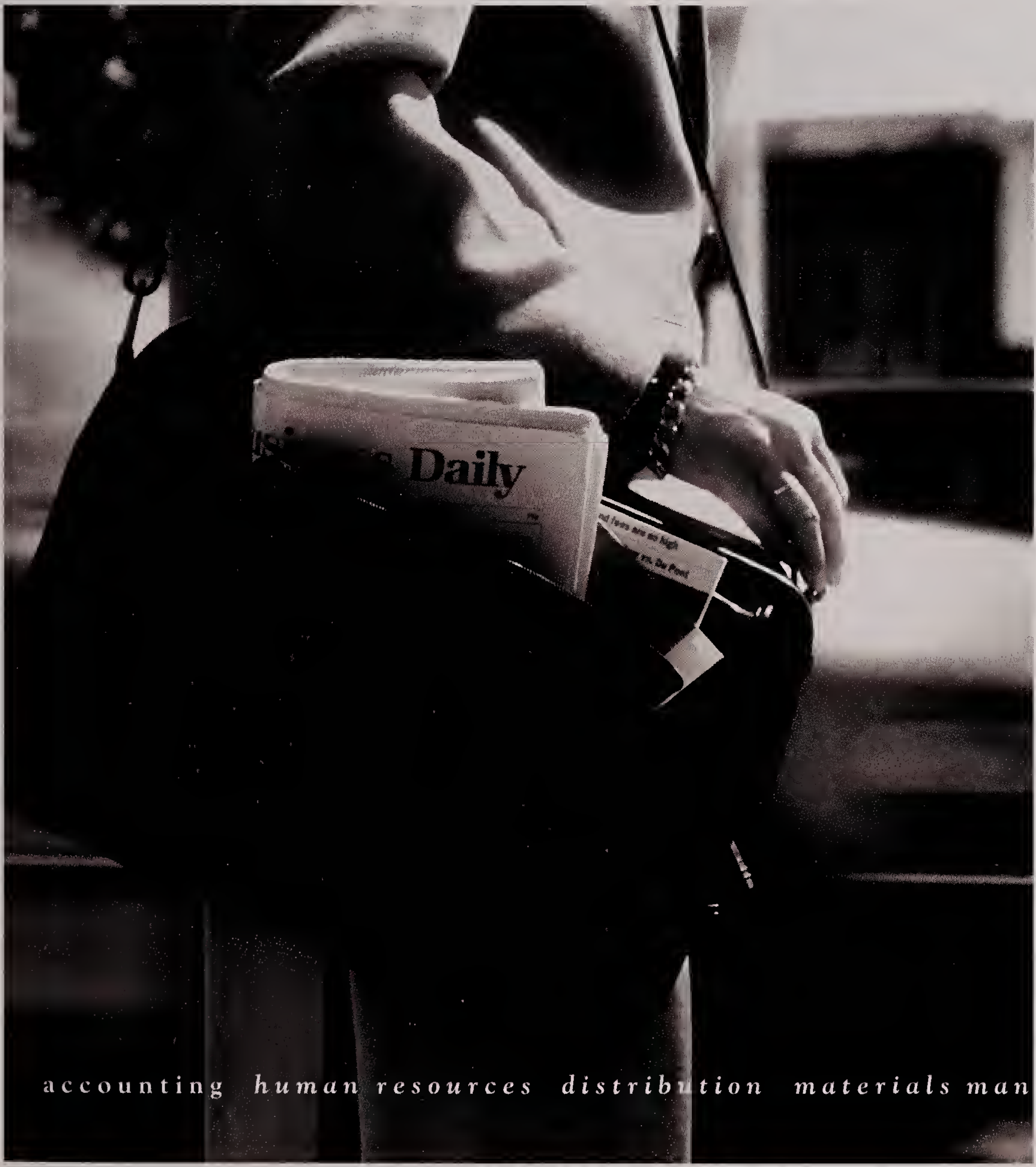
Computerworld Buyers' Satisfaction Scorecard



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